MEDICAL LIBRARY

SERIES 3, Vol. 17, No. 9

SEP 10 1934

SEPTEMBER, 1934

AMERICAN JOURNAL OF OPHTHALMOLOGY

CONTENTS

	Page
Original Papers	
Biomicroscopy of the limbus corneae in trachoma and other conjunctival diseases. Phillips Thygeson	787
Primary tumors of the optic nerve. Perce DeLong	797
Visual and orthoptic training. Joseph I. Pascal	801
Subconjunctival iron deposits after adrenin injections. Trygve Gunderson	807
Cataract extraction by the undetached conjunctival bridge method after preliminary iridectomy. Roderic O'Connor	809
Chlorine content of aqueous, vitreous, and serum. P. W. Salit	818
Newer knowledge of bacteriology applied to ophthalmology. G. Howard Gowen	820
A tangent screen with artificial daylight illumination. Conrad Berens, Dorothy Kern, and Brittain F. Payne	826
The possibilities of orthoptic training. George P. Guibor	834
Studies on the crystalline lens. Everette I. Evans	840
Notes, Cases, Instruments	
An unusual case of pigmentation of the retina. Charles O. Rice	847
A fragment of lens capsule in the anterior chamber. Ambrose Earl Edgerton and Charles Fulmer	847
Society Proceedings	
St. Louis, New England, Chicago, Nashville, Los Angeles, Royal	849
Editorials	
Light and color sense; 1934 Meeting of the American Ophthalmological Society; Prevention of congenital syphilis	858
Book Notices	861
Correspondence	861
Abstract Department	863
News Items	882

For complete table of contents see advertising page V

Copyright, 1934, Ophthalmic Publishing Company, 640 South Kingshighway, Saint Louis, Missouri

Subscription price in United States ten dollars yearly. In Canada and foreign countries twelve dollars.

Published monthly by the George Banta Publishing Company, 450 Ahnaip Street, Menasha, Wisconsin, for the Ophthalmic Publishing Company, 640 S. Kingshighway, Saint Louis, Missouri

Editorial Office: 640 S. Kingshighway, Saint Louis, Missouri

Entered as second class matter at the post office at Menasha, Wisconsin

"Know him *by the company he keeps"*

● A wise old sage it was, who whenever consulted about the standing of an individual replied in words now so oft repeated—"Know him by the company he keeps." . . . Such old world philosophy most certainly holds true in today's business life. Particularly can you judge a house by the calibre of the products they promote, because shoddy merchandise usually infers shoddy work and service. Whereas quite definitely, quality products mean quality craftsmanship. . . . That's why Riggs have always been so careful in selecting the products that are sold over our name. We know that our employees do things in only one way—the best. We know that only the best products are worthy of that type work. Furthermore, your success depends upon the satisfaction you give your patients and only products of undisputed quality interpret your refraction in a manner which leads to that certain satisfaction. . . . So we say, know us by the company we keep. Orthogon, Panoptik, and Soft-Lite Lenses. Loxit and other Bausch & Lomb mountings and frames.

Riggs Optical Company

AMERICAN JOURNAL OF OPHTHALMOLOGY
VOLUME 17 SEPTEMBER, 1934 NUMBER 9

BIOMICROSCOPY OF THE LIMBUS CORNEAE IN TRACHOMA AND OTHER CONJUNCTIVAL DISEASES

PHILLIPS THYGESON, M.D.
IOWA CITY

Pannus was present in all stages of trachoma throughout a series of 31 cases. The biomicroscopic picture of the normal and pathologic limbus is described; that of trachomatous pannus being quite characteristic and useful for differential diagnosis. From the Department of Ophthalmology, State University of Iowa Hospital and College of Medicine. Read before the Colorado Congress of Ophthalmology at Denver, June 22, 1933.

There is rather universal agreement at the present time that the corneal changes known as pannus are due to actual trachoma of the cornea and not to mechanical irritation from a roughened tarsal conjunctiva. Opinions still vary widely, however, as to the time of onset and as to the frequency of pannus in trachoma. In most textbooks of ophthalmology it is considered a late complication of the disease. Lindner[1] states that pannus is not present in young children and, in a recent monograph on trachoma, Morax and Petit[2] state that pannus can develop several weeks or years after the conjunctival infection. They say that it is not uncommon to see subjects who have severe conjunctival lesions but who have not the least infiltration of the cornea. The recent study by Schousboë[3] in Morocco indicates that pannus is present in an average of 60 percent of trachomatous children of four years of age, increasing to 100 percent at the age of seven. This is at variance with the recent statement by Wilson[4] that pannus in one form or another is invariably present in Egyptian trachoma. The difference may be accounted for by the fact that Wilson utilized the biomicroscope in his studies while Schousboë did so only occasionally.

The biomicroscopic study of trachomatous pannus has been reported by relatively few workers, notably Gallemaerts[5], Morax[6], Morax and Petit[2], Cuénod and Nataf[7], Wilson[4], and Howard[8]. Cuénod and Nataf, from studies of incipient pannus, believe that the limbic and corneal changes are early. They state that in the earliest recognizable stages of uncomplicated trachoma the upper limbus and cornea are the seat of subepithelial infiltrations and new blood- and lymph-vessel formations which are invisible unless viewed with the biomicroscope. Wilson finds that the first signs of pannus often become manifest at the same time or shortly after the appearance of follicles in the tarsal conjunctiva. Furthermore, he states that trachoma which has healed with gross scarring always shows long vessels in the cornea but that mild cases which have healed without macroscopic scars often show no gross corneal changes. By slitlamp examination, however, all such cases reveal definite invasion of the cornea by the end-capillary loops. He did not find this change in follicular conjunctivitis nor in cases of acute or chronic conjunctival catarrh.

The present study is intended to determine whether or not these findings apply to trachoma in the United States. In addition an attempt is made to determine the incidence and characteristics of limbic changes in other conjunctival diseases.

The Normal Limbus

The limbus has a rich vascular supply consisting of a superficial marginal plexus which occupies a triangular area with the apex at the termination of Bowman's membrane. This plexus is supplied by the posterior conjunctival

vessels and the anterior conjunctival branches of the anterior ciliary vessels. These vessels lie in several planes, three more or less distinct levels usually being visible. The most superficial plane is entirely conjunctival, the deepest episcleral, while the intermediate plane forms a plexus in relation to Tenon's capsule.

Although no absolutely regular arrangement of the limbic vessels occurs,

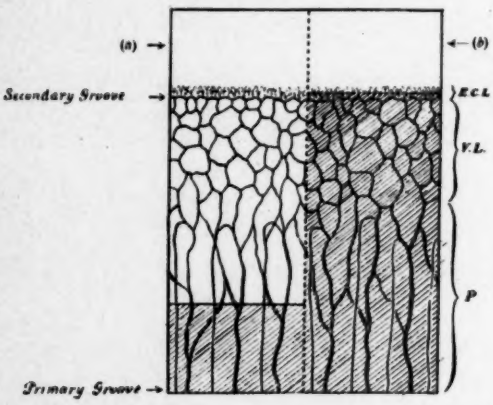


Fig. 1 (Wilson). Diagrammatic sketch of normal limbic vessels as seen with the slit-lamp, (a) by transillumination, (b) by focal illumination. E.C.L. = end capillary loops; V.L. = zone of vascular loops; P. = palisade zone.

Vogt[9] has divided the superficial layer schematically into three more or less distinct zones (fig. 1). The most peripheral zone is one of radial elongated vascular loops, termed the palisade zone because of the frequent presence of radial opaque stripes, the so-called palisades, in the conjunctiva. Next is the zone of vascular loops, consisting of an open meshwork of vascular anastomoses with an average width of 0.3 to 0.4 mm. (Wilson). The innermost zone is one of end-capillary loops, approximately 0.2 mm. wide. In the normal eye most of these capillaries are bloodless (fig. 2) but if the eye is irritated they fill with blood and may be seen clearly with routine magnification (Oc. 2, Obj. a 2). The mesh of this network is usually quite fine and its central border regular, but occasionally it is coarser and no sharp demarcation exists between this zone and that of the vascular loops.

With focal illumination all zones are opaque except the central half of the zone of end-capillary loops. The opacity diminishes towards the cornea and ends in a slightly serrated line just axial to the junction between the end-capillary loops and the vascular loops. By transillumination all zones are translucent except the peripheral half of the palisade zone. As mentioned by Vogt, there is a normal bedewing of the epithelium of the limbus which disappears toward the cornea.

The opacity of the limbus increases with age and the translucent area diminishes in width; the end-capillary loop zone occasionally becomes wider and the free border irregular. In a few elderly persons the end capillaries extend beyond their usual limits even though there is no history of previous disease.

Wilson suggests that the groove which is formed where the curvature of the sclera changes to that of the cornea be used to indicate the peripheral border of the limbus. This depression, which he terms the primary groove, is usually visible when using a moderately oblique narrow beam and focal illumination. The central border of the normal limbus may be measured as the

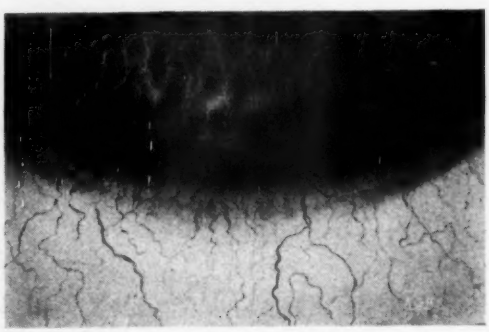


Fig. 2 (Thygeson). Normal limbus.

free edge of the capillary loops or as the opaque edge of the limbus when viewed with focal illumination. The small groove, which Wilson has designated as the secondary groove, may also be used. It coincides usually with the junction of the zone of vascular loops and end-capillary loops. It lies immediately peripheral to the opaque edge of

the limbus and is most prominent in young individuals. In adults it is often found with difficulty.

As it is the end-capillary loops which are primarily involved in the formation of pannus the present study deals principally with the condition of this end zone. Irrespective of its total width the limbus is considered normal if the end capillaries are normal. The end-capillary loop zone is considered abnormal if the loops are widened and extend into the cornea. The opaque edge of the limbus, as viewed by focal illumination, is used as a landmark in place of the secondary groove, as advocated by Wilson. In a series of fifty normal controls, the opaque edge was found to give a satisfactory standard. The capillary loops project just slightly beyond this edge, slightly farther at the lower limbus than at the upper.

In certain persons with normal conjunctivae an apparent vascularization of the upper limbus is present; this appearance is due to an unusually wide limbus. There is a relative increase in the widths of the vascular loop and palisade zones while that of the end-capillary loop zone remains normal. Although the limbus is widened the condition must be considered a normal variation.

Trachoma

Thirty-one cases of trachoma were available for study. Of these one was in stage I, three in stage IIa, three in stage IIb-III, seventeen in stage III and seven in stage IV. In five patients the disease was monocular. All showed gross or microscopic evidence of pannus.

Stage I. The single case seen in the incipient stage of the disease was in a young woman, aged 22 years, first examined in May, 1933. In July or August of 1932 she had noticed blurring of vision in the right eye; there was no discomfort but the eye appeared slightly inflamed. In March, 1933, there had been some irritation with a slight mucoid secretion and at that time her family had noticed drooping of the right upper lid. It was this symptom which brought her to the clinic.

On examination the uncorrected vision of the right eye was 6/12 and that of the left 6/6+. The right upper tarsus was studded with immature follicles characteristic of stage I (MacCallan); follicles were also present in the conjunctiva of the lower lid and fornices. Active pannus was present. Superficial vascular loops extended downward, slightly more than half way to the pupillary area. Beyond the vessels was a thin layer of superficial infiltrate which covered the upper three quarters of the pupillary area, thus accounting for the lowered vision. The extension was greater on the nasal side, the infiltrate here dipping down below the pupil. At the upper limbus, concentric with its border, was a row of slightly elevated translucent nodules, the so-called limbic follicles (fig. 3); they varied in diameter from 0.5 to 1 mm. and were surrounded by fine capillary networks. Several nodules were removed and examined histologically; they consisted of collections of small and large mononuclear cells (fig. 4).

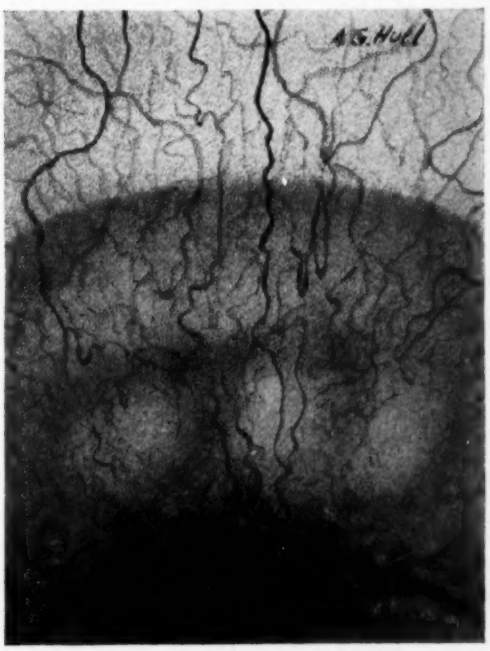


Fig. 3 (Thygeson). Limbic follicles.

The left eye, although symptomless, presented on the temporal third of the upper tarsus a number of small greyish-

white areas characteristic of immature follicles. There were a few mature follicles in the upper cul-de-sac. The conjunctiva of the lower lid appeared normal. At the upper limbus there was definite widening and irregularity of the zone of end-capillary loops with extension beyond of a number of round and

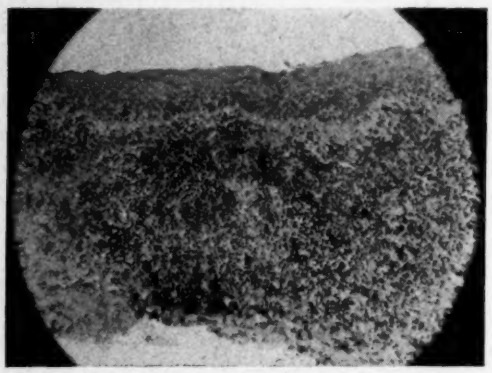


Fig. 4 (Thygeson). Biopsy of a limbic follicle.

irregular grayish superficial infiltrates (fig. 5). This change was confined to the upper two fifths of the limbus.

Expression and grattage of the conjunctivae of both eyes were performed and this was followed by daily applications of the copper-sulphate stick over a period of one month. Daily treatments at home with copper sulphate were advised.

The patient was seen again in October, 1933, at which time there were no complaints. The vision in the right eye had improved to 6/9 while that in the left remained at 6/6+. There was only slight ptosis. The conjunctiva of the right eye was hyperemic, only slightly thickened, and no follicles were present. However, there was slight scarring. The pannus had regressed considerably. The limbic follicles and the superficial infiltration had disappeared but long vessels remained in the cornea. In the left eye there was a small nest of follicles on the temporal side of the upper tarsus but the remainder of the conjunctiva was clear. At the upper limbus the superficial infiltrations had disappeared and there was partial retraction of the end-capillary loops but the latter were still widened and their free borders irregular, so that a complete return to normal had not taken place.

This case illustrates in the right eye a well-developed pannus and in the left eye the earliest recognizable limbal changes of pannus which in this instance appear to have begun simultaneously with the conjunctival disease.

Stage IIa. In the three cases of trachoma in this stage there was advanced pannus; in one, the pannus was complicated by ulceration. The corneae in the three patients presented almost the same picture. The upper part was invaded to the pupillary area by engorged superficial vessels of varying caliber, arranged in loops and arcades. The entire vascularized area was infiltrated and had a grayish spotty appearance. The

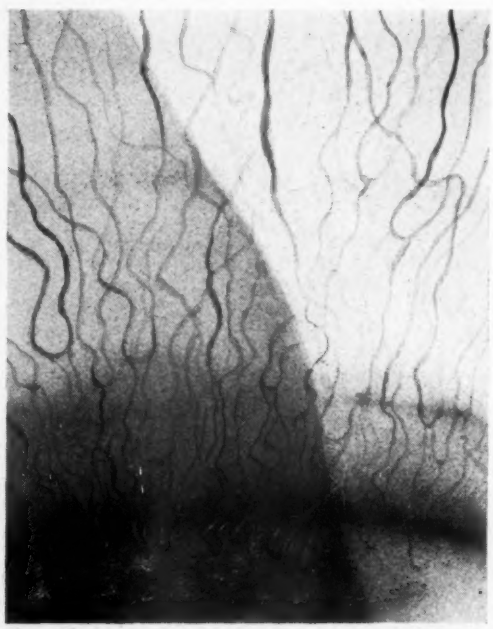


Fig. 5 (Thygeson). Incipient pannus. There is an extension of the end-capillary loops into the cornea and a superficial punctate infiltration.

infiltrate extended beyond the vessels into the pupillary area, probably accounting for the lowered vision which was always present. Although the vascularization was much more extensive above, there was invasion of the cornea by new vessels around the entire circumference.

Stage III. The seventeen cases of stage III showed, for the most part, a more advanced pannus with scarring resulting from recurrent corneal ulceration. In the typical picture there were marked superficial vascularization, infiltration, and cicatrization. Vision was reduced and the vascularization frequently covered the entire cornea. When a window was left it was always slightly below the center of the cornea.

An exception to this picture was present in two cases. The first was in a university student, aged 20 years, who came to the eye clinic because of a refractive error. He had contracted trachoma at about the age of ten years. Two lid-rolling operations had been performed and the copper-sulphate pencil used over a period of four years. On examination, however, a trachoma of stage III was found. There were scattered areas of mild though active disease over the tarsal conjunctiva of both lids and in the fornices. Under magnification, fine vascular loops were found in the cornea, extending about half way to the pupillary area (fig. 6). The appearance was typical of healed trachomatous pannus; there were no infiltrates nor have any signs of corneal activity appeared during the nine months he has been under observation. There were no corneal scars.

This was evidently a healed or inactive pannus of mild degree which did not become active when the conjunctival disease recurred. The trachoma has been extremely mild, due, no doubt, to the fact that it was contracted early in life. It is well known that the prognosis of trachoma contracted in infancy or early childhood is more favorable than that contracted in adult life.

The second case was in a young adult having trachoma of at least seven years' duration. The cornea of the right eye had been the seat of a severe ulceration which resulted in dense scars. This scarring involved the entire lower half of the cornea. The left eye had severe pannus, which was unusual because of the extensive vascularization of the lower quadrants. There was a single limbic follicle at "6 o'clock" and scattered about in the lower half of the cornea were five dense rounded masses of superficial infiltration, suggesting corneal follicles.

Stage VI. Pannus heals by absorption of the infiltrate and by cicatrization in a manner similar to the conjunctival lesions of the disease. After pannus is once established it is probable that the vessels never disappear, but it is remarkable, in some cases, to find how little damage is done to the cornea by long-standing trachomatous disease.

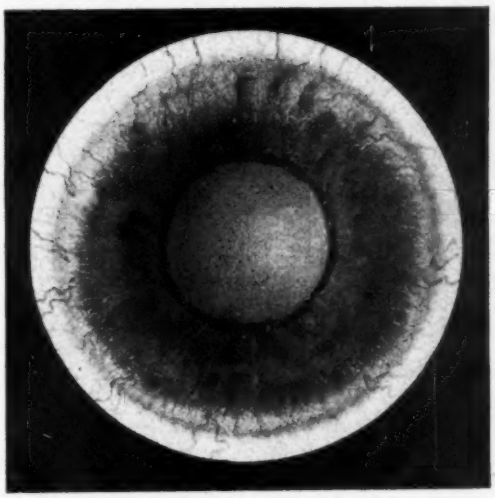


Fig. 6 (Thygeson). Inactive pannus in a mild stage-III trachoma.

Six of the seven patients in stage IV showed long vessels extending into the cornea. The arcade and loop formations were not so prominent and the vessels not so large and dilated as in the active stage. There was diffuse or spotty cicatrization, which varied in each patient. Severe corneal changes did not always accompany severe lid changes and inversely severe corneal changes were noted in two cases in which the conjunctival disease had not led to lid distortion. Two cases showed at the upper limbus a number of small rounded opacities arranged concentric with the cornea. These were interpreted as the cicatricial remains, known as Herbert's pits, of limbic follicles. The brilliant corneal reflex was generally diminished in corneae having healed pannus.

One of the seven cases was in a young negress with mild conjunctival scar-

ring. The corneae were normal grossly but with the slitlamp the typical structure of healed pannus was seen, although no scarring was present. The arborescent appearance of the superficial vascularization readily distinguished it from the broomlike deep vascularization of healed parenchymatous keratitis.

The type of pannus which here accompanied an exceedingly mild trachomatous infection, probably contracted in infancy or early childhood, is suggestive of the picture which Wilson described in Egyptian school children. He found a mild type of trachoma in which, by ordinary means of examination, no signs of previous trachomatous disease could be detected. There are no scars in the tarsal conjunctiva, the arrangement of the blood vessels is normal, and the cornea appears clear when examined with the loupe. With the corneal microscope, however, the zone of end capillary loops appears to be abnormal; the meshwork is more open and the loops are elongated 0.5 to 1 mm. beyond the secondary groove. The caliber of the vessels is increased, the shape of the loops is variable and the free edge of the zone is irregular. Wilson believes that such an appearance is always suggestive of previous mild trachomatous infection.

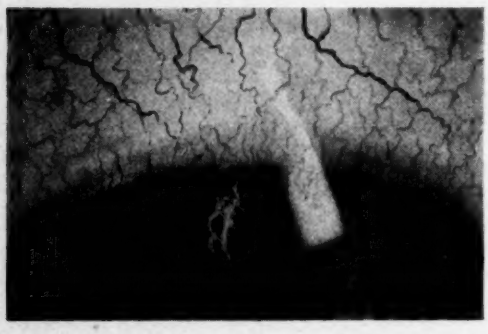


Fig. 7 (Thygeson). Abnormal limbus from the supposedly normal eye in a case of monocular trachoma.

Pannus in monocular trachoma. In five cases the disease was apparently monocular. All showed stage III of the disease in the affected eye and in four of the five there was active pannus with recurrent ulceration. In the fifth case the pannus was probably inactive. The unaffected eye in each case appeared normal to gross examination but in two cases the slitlamp examination of the limbus revealed the elongation of the end capillary loops with the penetration into the cornea (Fig. 7) which Wilson has stated is suggestive of previous trachomatous disease.

Is it possible that in these two cases there actually had been bilateral disease? In neither case had symptoms been present. On careful reexamination of the tarsal conjunctivae, an irregular arrangement of the vessels was noted in one case. No scars were visible.

Folliculosis and Follicular Conjunctivitis

The differential diagnosis between early trachoma and certain severe types of follicular conjunctivitis is not always simple. We in the United States, who see but relatively few cases of trachoma, are often referred to in the European literature as being unable to draw a clear distinction between the two diseases. Professor Lindner of Vienna is quoted[10] as saying that many of the cases of trachoma, so called, in America, are simply cases of follicular conjunctivitis.

The vascular and infiltrative changes that occur at the limbus in the early stages of trachoma are diagnostic signs of definite value in doubtful cases; i.e., in those cases in which the differentiation cannot be made by the conjunctival findings alone. In this study thirty-four cases of nontrachomatous follicular disease of the conjunctiva have been observed. Of these, eleven were classified as folliculosis, twenty as chronic follicular conjunctivitis, and three as follicular conjunctivitis, swimming-pool type. With the exception of one case of chronic follicular conjunctivitis the limbi were normal. This exception was in a girl fifteen years of age who had been treated for the past two years for trachoma. There was mild papillary hypertrophy of the tarsal conjunctivae of both eyes and a few follicles in the lower fornices. A mild blepharitis was present. The limbus of the right eye was

normal; in the left eye there was slight irregularity of the border of the zone of end-capillary loops but no extension into the cornea. Axial to the capillary loops were a number of minute punctate scars. Morax-Axenfeld bacilli were seen in films and recovered in culture in this case and there was rapid clearing of the conjunctival symptoms when appropriate treatment with zinc sulphate was instituted. This case was evidently not one of trachomatous infection.

Phlyctenular Keratoconjunctivitis

Only two cases of active phlyctenular keratoconjunctivitis were observed. In one case there was severe involvement of both corneae. In the right eye the zone of end capillary loops was widened and the free border irregular. Over the entire circumference of the cornea the loops extended well beyond their normal limits and projected far into the cornea above and nasally. There was also some deep vascularization. The remainder of the cornea was clear except in the lower portion where there were three small irregular scars below the pupillary area.

In the second case there was more extensive involvement of the cornea. The disease in the right eye was healed, but there was pronounced vascularization of the cornea with scar formation involving the pupillary area. Superficial vascular loops extended well into the corneal substance, especially below (fig. 8). There was no deep vascularization nor were there any active infiltrates. The left eye showed active disease. Below, in an area concentric with the limbus, was a row of superficial ulcers. The remainder of the cornea was clear. There was both deep and superficial vascularization of the cornea below, whereas the limbus above was normal.

In addition there were four cases in which a history of previous phlyctenular disease was obtained, although at the time of examination the eyes were quiet. Three of these showed abnormal limbi; i.e., superficial punctate scars and vascularization. In two cases the vascularity was irregular and most pronounced in the lower quadrants. The third case had what appeared to be the typical corneal picture of mild healed trachoma.

Catarrhal Conjunctivitis

There were twenty cases of acute conjunctival catarrh in the majority of which the infecting agent was the pneumococcus. Although extreme engorgement of the limbic vessels occurred, in no case was vascularization or infiltration of the cornea observed.

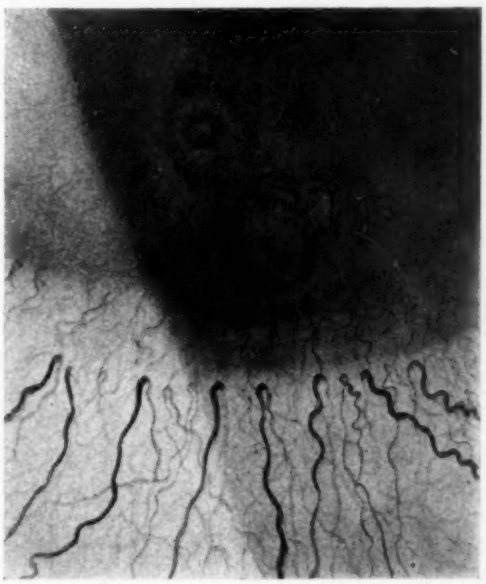


Fig. 8 (Thygeson). Pannus of phlyctenular keratitis.

Thirty-two cases of chronic conjunctival catarrh were also studied. Five of these showed slight widening and irregularity of the zone of end-capillary loops around the entire circumference of the cornea but no corneal infiltrates. The remaining twenty-seven cases were normal.

While this widening of the zone of end-capillary loops certainly could not be mistaken for incipient pannus nevertheless it might be confused with the changes described by Wilson as being associated with mild healed trachoma in Egyptian children. MacCallan[11], commenting on Wilson's article, states that changes in the end-capillary loops are in no way pathognomonic for trachoma and that they occur in acute conjunctiv-

itis and after irritation of the conjunctiva with silver nitrate and other agents. I have not observed such changes in acute conjunctivitis nor after drug irritation.

Acne Rosacea

In the single case of acne rosacea in this study there was a keratitis with superficial vascularization involving the lower outer quadrant of the right cornea; also recurrent ulceration. The location of the pannus was sufficient to differentiate it from that of trachoma.

Iridocyclitis

A small series of cases with acute and chronic iridocyclitis was examined. In acute iritis there were no limbic changes but in chronic iritis a number of pathologic limbi were seen. These changes were more frequent in cases in which a tuberculous etiology was probable. There was a widening of the zone of end-capillary loops but no infiltration. Confusion with the healed pannus of mild trachoma was possible.

Vaccinial Keratoconjunctivitis

While the patient in the one case of human vaccinial keratoconjunctivitis observed could not be subjected to slitlamp examination, the experimental disease in the rabbit was available for study. The instillation of vaccine lymph into the eye after light scarification of the conjunctiva results in an acute diffuse conjunctivitis with much secretion. The cornea usually is involved secondarily and with the slitlamp a rapid onset of pannus may be observed; there is superficial infiltration and extension into the cornea of the marginal loops. A week after the onset of symptoms the upper limbus may present a picture similar to that in early trachomatous pannus. The vessels persist after the disease has healed.

Vernal Catarrh

Five cases of vernal catarrh showing bulbar changes were studied. One was incipient, three moderately advanced, and the fifth extremely severe.

In the mild case, at the limbus, in line with the palpebral opening, there was a thickening of the conjunctiva and an irregularity of the corneo-limbic junction. A few fine capillary loops penetrated slightly into the cornea and occasional small corneal opacities were present. The limbus above and below was normal.

In the three moderately advanced cases there were white nodules at the sclero-limbic junction and nebulous opacities of the cornea near the limbus, with associated superficial vascularization. Again the changes involved only the horizontal meridian.

In the severe case, in each eye, a circumcorneal opacity, approximately 2 mm. wide, corresponded in position to an arcus senilis but had not the peripheral clear zone. Scattered in this opacity were small dots having the appearance of calcified nodules. There was superficial vascularity of the cornea.

No one of these patients had limbic changes which could be confused with trachoma. A number of reports in the literature, however, mention cases in which the limbic changes suggested those of trachoma. Trantas[12] mentions the appearance of nodules at the upper limbus simulating trachoma follicles and El-Tobgy[13] describes a young girl in whom the opacity covered the upper half of the cornea, ending below in nearly a straight line. He states that the gross appearance was that of trachoma but that the eosinophilia in the conjunctival smear and the slitlamp findings confirmed the diagnosis of spring catarrh.

Herpes Corneae

Five cases of herpes simplex were studied. One was mild while the other four were severe. In the mild case a number of small vesicles developed on the cornea which healed without limbic changes. The diagnosis in this case was proved by an inoculation of the rabbit cornea, which resulted in a typical herpetic keratoconjunctivitis. In the other four cases, corneal vascularization, both superficial and deep, rapidly developed. The vascularity was irregular and in two instances involved the entire cornea. It could in no instance be confused with trachomatous pannus.

Interstitial Keratitis

The limbus in interstitial keratitis is often the seat of superficial vascular changes; e.g., the so-called epaulet formation. In a typical epaulet there was extreme engorgement of the vessels at the upper limbus, with swelling and irregular invasion of the cornea by the capillary loops. There is a superficial resemblance to trachomatous pannus but the predominating deep vascularization readily differentiates the two conditions. An exception to this rule was observed in a single case. A girl, aged 11 years, was treated in the University Hospital for luetic interstitial keratitis. The disease was mild but ran its usual course in both eyes. When examined, two years after the healing of the disease, both corneae showed long superficial vascular loops having the typical arrangement of healed trachomatous pannus. In the right eye the loops extended into the pupillary area while in the left they extended from above just to the pupil. No deep vessels could be found. There was mild scarring with considerable irregular astigmatism. The corrected vision was 6/12 in the right eye and 6/9 in the left. In this case the vascular changes were typical of healed trachomatous pannus.

Epithelial Dystrophy

In a single case, interpreted as an epithelial dystrophy, marked changes were observed in the vessels of the limbus. There was a circular superficial grayish opacity of the cornea concentric and continuous with the opacity of the limbus. It extended centrally about half way to the pupil and ended in a wavy but distinct line. There was an extension of the capillary loops into this opaque zone and the caliber of the vessels was increased. There were no inflammatory signs.

Epithelioma of the Limbus

Two cases of epithelioma of the limbus were observed. In one of these an extension into the cornea with superficial localized vascularization somewhat resembled that of pterygium.

Summary and Conclusions

Gross or biomicroscopic signs of pannus were uniformly found in a small series of trachomatous subjects in all stages of the disease.

The vascular and infiltrative changes at the limbus in early trachoma offer a valuable sign in the differentiation of this disease from severe cases of follicular conjunctivitis. The slitlamp appearance of incipient pannus consists in a widening of the zone of end-capillary loops with extension of the loops into the cornea. The vessels are preceded by a diffuse or punctate superficial infiltration. While probably not absolutely pathognomonic for trachoma, this change has not been seen in the other types of conjunctivitis which were examined during this study.

The pannus of well-established trachoma presents certain characteristics which usually differentiate it from the pannus of other conditions. The vascularization involves the entire circumference of the cornea, is regular, and is most pronounced above. The infiltration which is a constant companion of active pannus always extends beyond the vessels.

Healed trachoma, irrespective of its mildness or severity, always leaves vascular changes in the limbus and cornea which are visible with the biomicroscope even though the cornea may appear normal to the naked eye. These vessels have a characteristic and uniform arrangement, always suggestive of trachoma, but other diseases may occasionally produce a similar appearance.

A variety of other keratoconjunctival diseases, particularly phlyctenular keratitis, have associated vascular changes in the limbus and cornea. In most instances such types of pannus can be readily distinguished from that of trachoma.

Two cases of monocular trachoma are reported in which limbic changes suggestive of healed trachoma were found in the supposedly normal eye. The possibility of an abortive trachoma in these eyes is suggested.

State University of Iowa.

Bibliography

[1] Lindner, K. Course in ocular bacteriology, Vienna, 1928, quoted from notes of C. S. O'Brien.
[2] Morax, V., and Petit, J. Le Trachome (conjonctivite granuleuse). Paris, Jean Morax, 1929.
[4] Schouskoë, F. Etude des aspects cliniques du début du trachome a l'aide de graphiques. Rev. Internat. Trachome, 1933, January, v. 10, p. 4.
[4] Wilson, R. P. A short slit-lamp study on the corneal vessels in Egyptian trachoma with a discussion of their diagnostic value in doubtful cases. Fol. Ophth. Orient., 1932, v. 1, p. 52; Sixth Annual Report Giza Memorial Ophthalmic Laboratory, Cairo, 1931, p. 110.
[5] Gallemaerts. Examen microscopique de la cornée au moyen de la lampe à fente. Paris, Masson et Cie., 1926.
[6] Morax, V. Complications cornéenes du trachome. Rev. Internat. Trachome, 1929, April, v. 6, pp. 90-94.
[7] Cuénod, A., and Nataf, R. Le Trachome. Paris, Masson et Cie., 1930.
[8] Howard, H. J. Recent developments in trachoma investigations. Trans. Amer. Acad. Ophth. and Otolaryng., 1932, p. 81; Amer. Jour. Ophth., 1933, March, v. 16, p. 218.
[9] Vogt, A. Lehrbuch und Atlas der Spaltlampenmikroscopie des lebenden Auges. Berlin, Julius Springer, 1930.
[10] Wilson, R. P. Sixth Annual Report Giza Memorial Ophthalmic Laboratory, Cairo, 1931, p. 103.
[11] MacCallan, A. F. Letter to Editor. Fol. Ophth. Orient., 1933, February, v. 1.
[12] Trantas. Les ocelles trachomateux de Bonnet et les follicules paralimbiques cornéens du pannus trachomateux. Arch. d'Opht., 1930, v. 47, p. 444.
[13] El-Tobgy, A. F. Spring catarrh in Egypt. Fol. Ophth. Orient., 1933, February, v. 1, p. 168.

PRIMARY TUMORS OF THE OPTIC NERVE

Report of a case

PERCE DELONG, M.D.
PHILADELPHIA

Optic-nerve tumors, as yet reported, are all apparently spongioblastic in type. Embryologically the optic nerve arises from an invagination of the primitive cerebral vesicle. It contains all of the adult forms of neuroglia; therefore, in all forms of gliomatous tumors of the optic nerve, the same characteristics should be found as in gliomas of the brain.

The histogenetic significance of the microscopic appearance met with in tumors of this class has caused considerable diversity of opinion; but Verhoeff showed that they are primarily composed of neuroglia. He described three types of tissue.

The fact that optic-nerve tumors usually manifest themselves early in life is at least suggestive that they are congenital in origin and are due to some more or less localized abnormality in the neuroglia of the nerve.

To date no definite differentiation of the spongioblasts into more advanced glia in tumors of the optic nerve has been reported, but it is only reasonable to suppose that with modern and scientific staining methods advanced glia will ultimately be found.
Read before the College of Physicians of Philadelphia, Section on Ophthalmology, December 21, 1933.

The study of primary tumors of the optic nerve during the past two decades has engaged the attention not only of the ophthalmologist, but also of the neuro-surgeon. Certain ideas and facts manifested by recent advances in laboratory technic (particularly staining methods) have greatly enhanced this study.

Because of this fact, Bailey and Cushing[1] have brought about a workable classification on an embryological basis, and have been able to study the predominating cell types found in the various brain tumors. The specific stains employed were chiefly the Cajal and Hortaga, which include the impregnation of silver salts. Unfortunately, the ophthalmologist has adhered to the old tradition of the hematoxylin-eosin stain, and has thus lost the advantage gained by this advance, particularly with reference to the staining of the nerve tissues of the globe (retina and optic nerve). Until an intensive study along these lines is made, a complete knowledge of the probable glial tumors and nerve elements cannot be accomplished.

Verhoeff[2] in his reference to the Bailey-Cushing classification states that: "Their classification doubtless is of some prognostic value as regards gliomas of the brain, but would seem to be of little significance as regards gliomas of the optic nerve. From just what kind of cells the latter tumors primarily arise it is impossible to determine, but there can be little doubt that ultimately they are composed of cells derived from astrocytes. For in the cases in which a portion of the nerve remains relatively normal, the gradual transition of astrocytes into tumor cells is easily recognizable."

The optic-nerve tumors as yet reported are all apparently spongioblastic in type. Embryologically the optic nerve arises from an invagination of the primitive cerebral vesicle. It contains all the adult forms of neuroglia. Therefore, in all forms of gliomatous tumors of the optic nerve, the same characteristics should be found as in gliomatous tumors of the brain already described by Bailey, Cushing, Penfield[3] and others.

The existence of primary tumors of the optic nerve has long been recognized. Von Graefe[4] was the first to review and summarize the facts then known about sheath tumors, but in 1879 Willemer[5] separated the intraneural from the extraneural tumors; and passing down the decades we note the pathological diagnosis changing through all types of neoplasms. The histogenetic significance of the microscopic appearance met with in tumors of this class caused a considerable diversity of opinion. Many were regarded as mesoblastic, epiblastic, malignant or benign, or of the true nature of a hypertrophy rather than a true new growth. They were referred to as sarcoma, myxosar-

coma, glioma, gliomyxosarcoma, adenna, endothelioma, etc.

An analysis of the literature reveals this diversity of opinion. Sattler[6], 1892, designated that of the essential tumors of the optic nerve, only a small portion were of the nature of endotheliomas, while the great majority conformed to a type which he designated as myxofibroma.

Hudson[7] 1912, collected, studied, and reported 182 cases. He was of the opinion that tumors developing in the nerve stem were apparently of the same nature, for he stated that different tumors in their development or growth showed varying degrees of tissue. In some there was a large amount of fibrous tissue present, which justified the term fibroma, while in others the presence of more embryonic tissue with varying-shaped cells (such as are met in the developing optic nerve) would lead to the diagnosis of glioma.

Byers[8] 1914, held that tumors growing within the dural sheath could not be sharply divided into two groups, because in the first place the basis of such growths was essentially an overgrowth of the fibrous connective-tissue elements of the optic nerve, and one found every phase of development from the embryonic myxomatous type to the fine fibrous bands described by the term fibromatosis. In the second group of neoplasms, the changes varied somewhat in character and were attributable to a proliferation of local endothelial cells, the growths being classified as endotheliomas. He added further that the two groups were histogenetically related.

Verhoeff[9] presented his classical paper on optic-nerve tumors, in 1922, wherein he differentiated three types of tissue, but made no attempt at classification. He stated that there is so much similarity in all these tumors as to leave no doubt that they are all of the same nature. Their differences are chiefly quantitative and, generally speaking, the same elements can be seen in all of the tumors, but in different proportion and arrangement. All are primarily composed of neuroglia.

He designated three principal types of tissue, any one of which may undergo transition to either or both of the others: (1) The finely reticulated type similar to, but not identical with the neuroglia of normal optic nerve; (2) the coarsely reticulated type, which appears to be an exaggeration of the first type; (3) the spindle-cell or coarsely fibrillated type, which consists of coarse neuroglia fibrils, many of which are partly spiral in form, with neuroglial cells lying between.

The fact that optic-nerve tumors usually manifest themselves early in life is at least suggestive that they are congenital in origin and are due to some more or less localized abnormality in the development of the neuroglia of the nerve. One will note that tumors of the optic nerve are composed essentially of neuroglia. The neuroglia may invade the nerve fibers and the connective-tissue stroma or it may grow in the subdural space. Histologically the neuroglia is similar to many gliomas of the brain, and can therefore be regarded as a true glioma.

Many of these tumors of the optic nerve are associated with excessive growth tendencies of the connective-tissue elements, an observation which has given rise to much conjecture. This is especially true in several cases in which gliomas of the optic nerve have been associated with von Recklinghausen's disease. While it is a fact that in this disease congenital malformation of the brain sometimes occurs, it does not follow that gliomas of the optic nerve are related to fibromas of the peripheral nerves, except that both may probably be dependent upon some congenital developmental anomaly (cell rests). Michel[10] was the first to notice this coincidence.

Golovine[11] likened it to a form of gigantism and admitted that a special hyperblastic inflammation of the optic nerve is analogous to certain conditions of elephantiasis.

Von Hippel[12] expressed the belief that this was an inherent growth tendency in both the glial and mesodermal tissues.

Verhoeff has noted that within the nerve stem the growth does not advance

by invading the original structure, but by causing the preëxisting neuroglia in the vicinity of the tumor to proliferate and take on the character of the tumor tissue. There is unquestionably an associated proliferation of the sheath. This process is not clear.

The fibers of the optic nerve are spread apart by the invading tumor cells and lose their myelin sheaths. The nerve fibers are destroyed, although some may remain intact.

These tumors are rarely vascular, the blood vessels found being chiefly in the septum, the common locality for vascular changes in the optic nerve. The blood-vessel walls usually show definite hyaline degeneration. Small degenerative cysts are an almost constant occurrence. They contain a homogeneous substance which was previously considered mucin, and for this reason they were formerly diagnosed as myxomas; but they contain a serous fluid with some fibrin (Verhoeff).

Löhlein's[13] opinion was that these cysts arise from degenerated areas secondary to the advanced degenerative and hyaline alterations in the blood-vessel walls. This explanation would seem more plausible.

Verhoeff's classification of the character of the cell has been the most complete. Though only ordinary nuclear stains were used, the general characteristics of the cell showed it to be long and spindle shaped, with oval nucleus, and processes arising from each end. Unquestionably all tumors of the optic nerve so far reported have been spongioblastomas, and until a more intensive study is made, the more advanced and adult glial cells already discovered in brain tumors will not be found in tumors of the optic nerve.

Enriquez[14] and Marchesani[15] found astrocytes and oliodendroglia in the normal optic nerve. Favalaro[16] found in optic-nerve tumors round cells without processes and with two or more nuclei, which he considered to be oliodendroglia. He also found astrocytes. To date no definite differentiation of the spongioblasts into more advanced glia in tumors of the optic nerve has been reported, but it is only reasonable to believe that with a modern and specific staining method, advanced glia will ultimately be found.

It is impossible to obtain an exact knowledge of the frequency of these tumors. At the Wills Hospital during the past twelve years, out of 230,742 admissions, but one case of this type has presented itself. At the Massachusetts Eye and Ear Infirmary, in the past thirty-six years, but four cases have been reported out of 669,857. It is estimated that less than three hundred cases of tumors of the optic nerve have been described in all medical literature.

Case report

Ester Thornton, a white female, aged 17 years, was admitted to the Wills Hospital on the service of Doctor Frank Parker, with a history of a protrusion of the right eye, which had been noted for the past three years and had become more marked during the last two months. She complained also of frontal headache.

Her father and mother were healthy, and there was no record of consanguinity. She had had the usual infectious diseases of childhood. The Wassermann test was negative.

On admission, her vision was, right eye, 6/30; left eye, 6/6 without glasses. There was marked proptosis of the right eye; no apparent diplopia. The cornea was clear, the pupil round, reacting to light and accommodation. No other gross external pathology was observed. The fundus was negative. The left eye appeared to be normal externally, as was also the fundus.

The clinical diagnosis was cyst of the orbit. The globe and tumor were removed intact, March 28, 1933.

Pathological examination. *Macroscopic:* The specimen was a globe with tumor attached. This tumor was roughly ovoid in shape, extending from the globe backward, 26 mm. It measured 22 mm. in its gross cross diameter. The connection with the globe was constricted to 3 mm. in diameter and the posterior cut end was about 5 mm. in thickness. Section of the globe revealed no definite pathology.

The extraocular growth, upon sec-

tion, was found to be entirely within the dura, which formed a capsule for it. The tumor consisted primarily of an enlargement of the nerve stem, the latter reaching a thickness of 21 mm. The tumor cells had broken through the pia and had greatly extended the subdural spaces in all directions.

Microscopic: The specimen was fixed in Zenker's solution. Sections were made along the axis of the optic nerve. There were, however, some medullated nerve fibers present.

Beginning with the globe, the nerve stem showed a marked increase in the neuroglial cells. Many of the new cells were spindle shaped. Posteriorly, coarse neuroglial fibers began to appear, and the nuclei became less uniform in size. In the tumor itself, all the cells were spindle shaped, running in various directions.

Between the bundles were numerous neuroglial strands, staining deeply with eosin. The differential neuroglial stains, however, showed that these strands consisted chiefly of gross neuroglial fibrils, and their accompanying spindle cells ran along within the delicate tissue septum. Vacuolization of the cells was quite conspicuous, leading to the formation of a few small cystic cavities.

The Mallory connective-tissue stain showed the delicate septums accompanied and invaded by the tumor cells. The blood vessels were small and their walls showed hyaline degeneration. The cystic bodies were numerous and appeared in strands containing coarse neuroglial fibers. The normal structures had been entirely replaced by neuroglia.

The predominating tissue in this case was the coarsely reticulated type, though it also contained some coarsely fibrillated types.

The optic-nerve disc showed some papilledema, but the globe was otherwise normal.

Conclusions

1. All primary intraneural tumors of the optic nerve are gliomas.

2. These tumors are essentially congenital in origin and depend upon some abnormality of the neuroglia.

3. Gliomas of the orbital portion of the optic nerve frequently involve the lower cranial cavities but, in spite of this fact, recurrence after complete removal of the optic-nerve tumor has never been reported.

4. The malignancy of optic-nerve tumors, as established by Bailey and Cushing, points to the fact that the earlier the cell type in the histogenetic series of development, the more malignant is its nature.

5. To date (with few exceptions) all reported gliomas of the optic nerve have probably been classified as spongioblastomas; but it is logical to suppose that with the newer staining methods advanced glia will ultimately be found.

Physicians Building.

Bibliography

[1] Bailey and Cushing. Tumours of the glioma group. Philadelphia, J. B. Lippincott Co., 1926.
[2] Verhoeff, F. H. Tumors of the optic nerve. In Penfield's "Cytology and cellular pathology of the nervous system." New York, Paul B. Hoeber, Inc., 1932, v. 3, sect. 21, pp. 1029-1039.
[3] Penfield, W. Cytology and cellular pathology of the nervous system. See ref. 2, above.
[4] Von Graefe. Graefe's Arch. f. Ophth., 1865, v. 10, p. 193.
[5] Willemer, F. Graefe's Arch. f. Ophth., 1879, v. 25, p. 189.
[6] Sattler, H. Beitr. z. Chir., Festschr. Theodor Bullroth. Stuttgart, 1892, p. 314.
[7] Hudson, A. C. Roy. London Ophth. Hosp. Rep., 1912, v. 18, p. 317.
[8] Byers, W. G. M. Jour. Amer. Med. Assoc., 1914, v. 63.
[9] Verhoeff, F. Arch. of Ophth., 1922, v. 51.
[10] Michel, J. Graefe's Arch. f. Ophth., 1873, v. 19, p. 145.
[11] Golovine, S. S. Arch. d'Opht., 1918, v. 36.
[12] Von Hippel, E. Handbuch der gesamten Augenheilkunde. Berlin, Julius Springer, 1923, v. 7B.
[13] Löhlein, W. Graefe's Arch. f. Ophth., 1914, v. 73, p. 335.
[14] Enriquez, L. Bul. de Real Soc. Esp. de Historia Natural, 1926, v. 26, p. 1.
[15] Marchesani, O. Graefe's Arch. f. Ophth., 1926, v. 117, p. 578.
[16] Favalaro, G. Ann. di Ottal. e clin. ocul., 1928, v. 56, p. 619.

VISUAL AND ORTHOPTIC TRAINING

JOSEPH I. PASCAL, M.A., M.D.
NEW YORK

Visual and orthoptic exercises are advocated for all cases of concomitant strabismus, either as a complete procedure or as supplementary to operation. Visual exercises concentrate on developing rapid and steady fixation, dynamic form vision, and accurate projection and orientation. Orthoptic exercises tend to arouse, first, biperipheral vision, then bimacular vision, overcoming macular resistance by means of identical or compatible images presented for fusion. Exercises which develop hand and eye movements in a common binocular field of projection are especially good. To check on fusion as against suppression the bimanual projection test is used in addition to the control marks in the stereoscope or amblyoscope. This is an abstract of a paper read before the Eastern New York Eye, Ear, Nose and Throat Association, at Schenectady, November 22, 1933.

Visual and orthoptic training are two closely interdependent phases of ophthalmology. By visual training is meant developing and enlarging the visual capacity of an eye that has subnormal vision; it is largely monocular in character. By orthoptic training is meant developing and enlarging the capacity of the two eyes to work together, as a unit, in the ordinary acts of vision, primarily a binocular matter. By and large, the two go together, and visual and orthoptic training for the purpose of improving or reëstablishing the coordination of the two eyes for efficient binocular vision may be considered as a single line of procedure, applicable primarily, but not exclusively, to cases of manifest strabismus.

The more one works in the field of visual training the more one appreciates the fact that vision is dependent not only upon processes in the retina and optic nerve, essential though they may be, but also very largely upon the mind and on the training in seeing that has been received. In other words, vision is a mental process; everybody must *learn* to see and no two people learn to see in the same way. To develop seeing, therefore, in an eye that has not learned how to see, or has forgotten how to see, the ophthalmologist must assume somewhat the teacher's attitude; he must have a flexible procedure to meet individual idiosyncracies.

The first step is to develop steady, sustained, and rapid fixation by the squinting eye. Before proceeding, it may be well to consider for a moment the nature of fixation.

If a light is thrown on the eye of a newborn infant, he will turn his eye for a moment to fix the light. This so-called fixation reflex is the first visual response in the process of learning to see. Whether a true reflex or not, the turning of the eye is in response to a mental urge, to a desire for *more* of the stimulus. The fixation movements of adults have the same basis. To use a rather crude analogy, the retina may be regarded as a glass screen which separates the outside world from the mind. In the screen is a little door, the macula, through which entrance to the mind is gained. When something beyond the glass screen, so to say, arouses interest there is an urge, a mental drive, to admit that something to the mind. And so the eye is turned in order to expose the macula, or the open door for the passage of the object of attention. The essential point to be noted is the fact that fixation and movements for fixation are due to a mental urge. The stronger the mental urge and the more responsive the patient can be made towards this urge, the quicker and more accurate will be his fixation movements.

Controlled and accurate fixation movements develop during the growth of the child and are essential for correct orientation. The process of seeing is usually stated as having three phases, the visual response to light, form, and color. But effective seeing depends very much upon correct orientation; that is, localization of objects in space with reference to direction and distance, relative both to the observer and to one another. Exercises for correct orientation and projection are very important and are frequently made use of in visual and orthoptic training.

The simple law of projection is that an impression on the retina is referred to outside space along a line from the stimulated retinae area through the nodal point. But this conception of the process of projection as a geometrical, mechanical law is serviceable only if its limitations are realized. Projection is primarily psychic, and correct projection has to be learned in association with the development of the other senses, especially touch. An eye that has not learned correct projection, or has forgotten it, as for example, the squinting eye in an old case of strabismus, locates objects in space in some bizarre way.

It is easy to prove that even in normal eyes projection is not strictly bound to particular points of retinal stimulation or to the position of the nodal point. Ordinarily one is aware of something moving in the field of vision either from the movement of the retinal image when the eye is stationary or from the consciousness of the movement of the eye, or, more accurately, of the innervations involved in retaining the image of a moving object on the macula. When the image of the object does not move on the retina, and the eye itself makes no movement, one would not expect to note any movement of the object. And yet there is a simple experiment, described many years ago by Maddox, which proves the contrary.

If one fixes with both eyes a small, white spot, for example the head of a white pin, on a dark background, at about 8 inches, and then covers the right eye, one notices that the white spot *moves* to the right. The object has not moved, the left fixing eye has not moved and yet the image is projected more and more to the right. If the left eye is covered, the image is projected to the left, even though there has been no movement of the object, or of the retinal image, or of the fixing eye.

The reason for the apparent movement is this: When one converges on the spot, there is a certain convergence innervation to the eye muscles. When the right eye is covered, it is no longer necessary to maintain perfect convergence of the two eyes, and the convergence innervation relaxes. The innervation being binocular, the relaxation must be binocular, tending to let the right eye turn to the right and the left eye to the left. There is nothing to prevent the right eye, i.e., the covered eye, from turning to the right. But if the left eye turned to the left, it would no longer fix the object. Therefore, in order to maintain the fixation for which there is a mental urge, another innervation is produced, i.e., a dextroversion. In the right eye, the dextroversion impulse is added to the relaxed convergence and the eye moves more to the right. In the left eye, the fixing eye, the dextroversion impulse neutralizes the relaxation impulse to the left and so the eye makes no movement. But one is mentally aware of a dextroversion innervation, that is, an impulse which normally moves the eyes to the right, and so one concludes that the object is moving to the right. The false projection of the object to the right is due entirely to the mental appreciation of an innervation to the eye muscles. The relaxation of the convergence innervation generally leads one also to project the object a little farther than it is.

Correct projection, conditioned either by the movement of an image on the retina, or by the movement of the eyes, or by the consciousness of innervations, must be learned, and exercises to train the squinting eye in correct projection can be given along with the exercises for fixation and form vision.

Fixation exercises should be varied and should include flash fixation, alternate rhythmic, voluntary continuous, voluntary discontinuous, radial, and reflex exercises. Moreover the targets at first should be such as will strongly arouse the patient's urge to see. This can be obtained by introducing into the target a variety of form, color, and movement.

Exercises for improving form vision seek to develop an appreciation of eye movements and hand movements as essential factors. The recognition of form depends not only upon the retinal image as a passive thing, but upon attention, mental training, and experience derived from associated eye move-

ments. One "feels" all about an object with his eyes as one feels all about an object with his hands. The coördination of hand and eye movements should be begun early in the course of the exercises. The sense of touch is unquestionably one of the important allies in developing the sense of sight, whether it be, as the German physiologist Wundt has said, that the sense of sight teaches the sense of touch, or the reverse, as Dr. Stevens taught.

Exercises in form vision tend to develop something similar to dynamic vision. Suppose, for instance, that a patient's central vision is only 20/200 which is less than the normal paramacular vision. Now, if he can make out the form of a 200-Snellen letter at 20 feet he can recognize the form of an object which subtends an angle of a little under one degree. Most of the objects in one's near-vision range subtend an angle of one degree or more and really come within his power of vision. Newspaper headlines and most of the advertisements in newspapers, magazines, etc., subtend angles of one degree or more, and therefore should be seen easily by anyone whose vision is only 20/200. The awkwardness of the patient when first trying to see the things about him is due to his lack of training and to the fact that his appreciation of form is based merely upon the retinal image as a passive thing and not upon the active movements associated with the process of seeing detail. In other words, this patient has a static vision of 20/200. But even if the response of the retina and optic nerve cannot be raised to more than 20/200 vision, the patient can still develop *dynamic* vision of 20/200 by developing appreciation of eye movements and corresponding innervations. This sort of vision will enable him to get about and to do many things which he had previously thought were beyond him, due to the limitations of the "bad" eye.

In orthoptic training, also, the training is largely mental. The patient who has an actual squint uses only one eye for seeing. He has learned to suppress the vision of the other eye. The doctor's aim then becomes fourfold:

(1) He must overcome suppression of vision; that is, develop the patient's eyes so that spontaneous and simultaneous vision in both eyes is easily obtained, leading at first to diplopia.

(2) He must develop simultaneous perception of both macular images, projected to the same point in space, and fusion when this is possible; i.e., reestablish bimacular vision.

(3) He must develop some fusion amplitude.

(4) He must, as far as possible, develop an appreciation of depth or stereoscopic vision.

To arouse simultaneous vision so that whenever the two eyes are open, both will respond to visual impressions, one of the important steps from the very beginning is to cover one eye every time the other is used. The mind must be weaned from the habit of suppression. By constantly occluding the eye, good or bad, which does not participate in vision, the tendency is to break down the habit of suppression. This is the procedure which was so strongly insisted upon by Javal some forty years ago.

After diplopia, i.e., simultaneous binocular vision, is once obtained, the doctor, in a manner of speaking, plays with it, in the sense that the images are moved around by means of prisms or otherwise. Such exercises, given both at distance and near, are really exercises in diplopia. The aim is to produce *spontaneous* diplopia without coaxing or special targets, so that whenever the two eyes are open they will both respond.

Ordinary diplopia is what may be called biperipheral vision. By this is meant that when the image of the object of attention, for example a light, falls on the macula of one eye and on the peripheral part of the other eye, one is made mentally conscious of two separate lights. The object of attention is seen double. If the left eye fixes the light and the right eye turns in, the image of the light which falls on the nasal part of the right macula is projected towards the temporal side and two lights are seen. But the image of another object which happens to fall on the macula of the deviating right eye

is entirely suppressed. That is, bimacular diplopia, or, rather, bimacular vision, is not obtained.

It may be well here briefly to mention the law of projection of macular images. It is a fundamental fact in physiologic optics that the two macular images, if mentally perceived, are always projected to the same point in space. This common projection of the two macular images is probably the most powerful factor in developing fusion. The images on the two maculae may be: (1) similar images of the same object, (2) different images of different objects but compatible, (3) different images of different objects and incompatible. If the macular images are similar, such as are obtained when one normally fixes an object with both eyes, both macular images are fused and projected to the same point in space where but one object is seen. If the macular images are different but compatible, e.g., seeing a bird with one eye and a cage with the other, both impressions are also projected to the same point in space, and the combination is mentally blended into one unit; i.e., bird in a cage. But if the macular images are different and incompatible, e.g., one macula has the image of a cat and the other macula the image of a rabbit, the cat and the rabbit cannot be imagined occupying the same space, so that one image or the other is alternately suppressed.

In the development of a squint, when one eye first deviated from the object of attention, call it the essential object, there resulted a macular image of the essential object in the fixing eye and a peripheral image of the essential object in the deviating eye. There was also, possibly, a macular image in the deviating eye of some other object in the field of vision, call it an accidental object, something in which the mind had no interest. It is certain that at least for a time there was *diplopia* of the *essential* object; i.e., biperipheral vision. If the object of attention was a light, the patient saw two lights. Such vision, i.e., seeing the object of attention double, is generally annoying, sometimes intolerable, but within limits; for seeing *two* similar objects is not a very unusual experience. Two similar lights are often seen side by side, even two similar faces side by side. Such diplopia is disturbing only when one *expects* to see one object. In the course of time this diplopia or biperipheral vision disappears through the suppression of the nonmacular image.

It is questionable, however, if there was at any time bimacular perception of the essential and accidental objects. To perceive both at the same time would necessitate projecting two different objects to the same point in space, and this would be absolutely bewildering. One cannot conceive of two objects occupying the same place: it is something contrary to all experience; so that the patient quickly learns completely to ignore the macular image of the accidental object. This, however, is not simply a passive process of ignoring; it frequently becomes an active process of resistance, macular resistance it may be called, and this must be fought when the attempt is made to reëstablish bimacular vision.

Normally, when the macular images are similar or compatible, there is what may be called bimacular projection of bimacular images. If a pair of split slides representing a right- and left-view photograph of a baby, are placed in a stereoscope, we get, at a certain separation of the slides, fusion of the two. A subject with normal binocular vision sees one baby. If we place a pointer in his right hand and ask him to point to the baby, he points directly to the right picture, and can trace the outline of the picture. If we place the pointer in his left hand or move his right hand over and ask him to point to the picture, he points directly to the left picture. Of course to him there is no right nor left, he sees only one picture. The same happens when the examiner points to the right or left picture or to both while the patient looks through the stereoscope. This may be called bimacular projection of similar bimacular images.

But there also is in normal eyes what may be called bimacular projection of a unimacular image. If, in the stereo-

scope, the picture is placed before one eye and a neutral ground before the other, the normal subject will see the picture in each stereoscopic field. He projects the image on one macula into both fields along each visual axis and can point to it on either side. This, of course, is due to a fusion of the two visual fields, but it may be conveniently called bimacular projection of a unimacular image.

When, however, there is suppression of one macular image, there is no bimacular projection. This projection test may be used to determine whether or not the patient really has bimacular vision. We may present the identical object before each eye, produce diplopia, and then move the slides so that the images tend to come together. After some maneuvering we may get them to become one, or so the patient says. But if we try the projection test we may find that he projects the image in only one stereoscopic field, the macular image of the other eye is suppressed. A very interesting phenomenon in such cases is that we sometimes find that the patient gets biperipheral projection; that is, he correctly projects in both fields peripheral control marks, but suppresses the central image of one eye.

In rebuilding coördinate binocular vision in the strabismic patient, there is little difficulty in arousing peripheral diplopia or biperipheral vision, but great difficulty in reëstablishing bimacular vision. Frequently the images which were previously separated horizontally, but were on the same level, begin to separate in a vertical plane as soon as they approach each other. One image tends to jump persistently, down or up. More often, if the images remain on the same level, instead of fusing, one image tends to jump across the other, being now to the right, now to the left of it. It seems at first apparently impossible to fuse the two images, or to project them to the same place.

These difficulties are largely a manifestation of what may be called macular resistance. A mental resistance has been built up against registering both macular images at the same time. The vertical imbalance, shown when the images are close, is frequently a false imbalance, possibly a turn of the eye in order to shield the macula. It sometimes takes a good deal of effort to overcome this macular resistance.

Some exercises can be given with very little apparatus, merely a set of prisms, loose, rotary, or mounted on a bar, and some fixation targets, a light, a letter, a cross, a red disc, etc. If good projection has been acquired as a result of other exercises in fixation, orientation, and projection, these exercises for producing diplopia and fusion will be greatly facilitated. Otherwise bizarre projections and little response to a very strong prism may be obtained.

Many more exercises and generally more effective exercises can be given with the stereoscope, especially with the use of moving slides such as the Keystone series. With identical or compatible object slides of striking, colorful, familiar objects, biperipheral diplopia is created, alternately fixing with one eye and the other. Then one object slide or both are moved in order to produce bimacular projection and fusion. Here temporary paramacular suppression and macular resistance are frequently encountered and must be overcome.

A word about the control marks. Sometimes the patient may fuse the images and not see both control marks at the same time. If these are not prominent, and when placed on the pictures they usually are not, one of them may be ignored, especially by the "bad" eye intent upon the pictures. On the other hand, sometimes the patient may claim to see one object with both control marks and yet ignore one macular image. The writer does not depend entirely upon the control marks. These are supplemented with other tests, one of them the projection test mentioned above.

The amblyoscope is another useful instrument in this work. Here again pictures of different kinds are presented before the two eyes to create diplopia and then fusion. Here again, on trying to bring the images together, it is often found that one of the images jumps across or up or down. By various

maneuvers it is possible to bring the images together for fusion. The following procedure illustrates an important principle: When the position of the tubes is found at which the images tend to jump across, the patient is instructed to close his eyes, the tubes are placed in proper position and two compatible charts, one a clock face, and the other corresponding clock hands, are placed in the instrument. The patient is asked to open his eyes and say what time it is. Very often he will say, "It is twenty minutes to four." For a moment or two he can keep the images together, then they break again. The psychological significance of this follows from the earlier discussion. All through the duration of the squint, before the patient comes to the doctor, the essential object on which the mind was set was seen by the fixing eye, and an accidental object in which the mind had no interest had its image on the macula of the deviating eye. This image was persistently ignored. The eyes never experienced a situation where both macular images were of equal interest. But with these two charts and the question as to the time both macular images become of equal importance. There is a mental urge to tell the time and the two macular images, both of which are essential for satisfying this urge, are simultaneously perceived and properly projected.

There are many desirable instruments available which greatly assist in orthoptic training. But the point is that for success in this work the most important thing is the knowledge of the man behind the instruments. With such knowledge, homemade devices will secure results; without such knowledge a room full of instruments is unavailing.

In conclusion, orthoptic training is to be considered as one step in the treatment of squint. Sometimes this is all that is necessary. At other times it must be combined with an operation which will set the eyes in an approximately correct position. The operation *per se* should also be considered as merely one step in the treatment and should be preceded and followed by orthoptic training. In this way the doctor can render his strabismic patient a really complete service.

Summary

In some cases of concomitant strabismus it is possible to improve the vision of the squinting eye and remove the deformity by means of visual and orthoptic exercises. In other cases, the exercises have to be supplemented by an operation. First come exercises for developing rapid, steady, fixation of the squinting eye; then those which aim to develop dynamic form vision, the latter being dependent upon an appreciation of the ocular movements and innervations involved in seeking an object. These coordinate hand and eye by drawing, grasping, or handling the object seen, and simultaneously tend to develop proper projection and orientation. Orthoptic exercises tend to reawaken biperipheral vision, that is, the simultaneous response of both eyes to the object of attention; and then bimacular vision, that is, the simultaneous response of both maculae. Here one encounters a sort of "macular resistance," due to the *active* suppression of one macular image. In arousing and redeveloping biperipheral and bimacular vision, a set of prisms, a stereoscope, and an amblyoscope provide the minimum equipment to which may be added other effective instruments. In using the stereoscopic charts dependence should not be placed entirely on the control marks, but the presence of bimacular vision should be checked by the bimanual projection test, using two pointers, preferably of different colors.

500 West End Avenue.

SUBCONJUNCTIVAL IRON DEPOSITS AFTER ADRENIN INJECTIONS

TRYGVE GUNDERSON, M.D.
BOSTON

The black deposits remaining at the site of subconjunctival injections of adrenin consist of complex organic salts formed from the reduction of ferric chloride by the adrenin. Iron is dissolved from the hypodermic needles by the strongly acid "adrenalin hydrochloride," and is present as small amounts of ferric chloride. This is immediately reprecipitated by the strong reducing action of adrenin. All samples of "adrenalin hydrochloride" were found to be strongly acid to litmus paper and to have a hydrogen-ion concentration in the vicinity of 5.6. More black deposit is formed when old needles are used because they contain a film of ferric oxide over their inner surface, which is more readily dissolved by the adrenin than is pure steel.

In order to avoid these black iron deposits, platinum needles should be used which are completely insoluble and rust free. The use of subconjunctival cotton pledgets soaked in adrenin is also recommended. From the Howe Laboratory of Ophthalmology, Harvard University, and the Massachusetts Eye and Ear Infirmary.

Ophthalmologists employing the subconjunctival injection of adrenin to dilate the pupil frequently find black deposits remaining at the site of injection. In a stubborn case of chronic iritis which has had many such injections, it is not uncommon to find a number of these disfiguring spots surrounding the limbus. Their disappearance is very slow, and I have known of cases where excision has finally been necessary.

My first thought in observing these spots was that a rusty needle had been used in making the injection. I found, however, that spots continued to form after using needles which had been carefully cleaned. Furthermore, spots occasionally developed after using new rustless chrome steel hypodermic needles.

Having in mind the commonly used method of blackening the cornea as a substitute for tattooing, a direct parallelism was seen. In this procedure gold or platinum is precipitated on the denuded cornea from the corresponding soluble gold or platinum chloride by the direct application of adrenin.

It remained to determine whether or not the adrenin could dissolve iron from the inside of the needle. All samples of "adrenalin chloride" that could be obtained showed a strongly acid reaction to litmus paper, indicating the presence of free hydrochloric acid. A direct hydrogen-ion determination on the samples showed a value of 5.6. I have found that precipitation quickly occurs if an attempt is made to neutralize the solution.

A test for iron was made on the stock "adrenalin chloride" with negative results. However, after running it slowly through a new needle, a strongly positive test for iron was obtained. The prussian-blue reaction was used, and the characteristic color obtained after adding to the solution potassium ferrocyanide and a few drops of hydrochloric acid. Therefore, we must assume that iron was added to the "adrenalin chloride" by its passage through the needle.

The precipitation of iron in the conjunctiva is more difficult to explain. We know that adrenin is a very strong reducing agent, which will precipitate heavy metals from their respective salts. In the "tattooing" process metallic gold or platinum is precipitated on the cornea. With ferric chloride a complex iron-adrenalin compound is formed, the chemistry of which is not known. It has a deep bluish appearance and is without doubt the identical substance that is deposited under the conjunctiva after an adrenalin injection.

The dissolution of metallic iron by the acid adrenalin is of course very slight. Therefore, when using absolutely new chrome steel hypodermic needles it is possible to make injections without the formation of subconjunctival deposits. If there be the slightest film of ferric oxide on the interior of the needle, which is very likely when needles have been in contact with moist air for any period of time, and more likely after boiling them in water, the dissolution is made very easy, and precipitates are sure to form. It is noteworthy that

the reaction between soluble iron and adrenalin occurs only when iron is present in the ferric state. No precipitate is formed from ferrous chloride. This may explain certain delayed reactions under the conjunctiva, for time must elapse for the ferrous oxide to be oxidized to ferric oxide and then to be reduced by the adrenalin.

The usual reaction occurs immediately after the solution appears under the conjunctiva. It may be that only the adrenin solution remaining within the needle for a short time during the preparation of the syringe takes up enough iron to cause the black precipitate. The solution contained within the syringe itself passes through the needles so quickly that little or no iron is dissolved, and consequently the periphery of the conjunctival bleb remains clear around the darkened central area where the injection was started.

Obviation of the conjunctival deposits can be accomplished in any one of several ways:

1. By the use of platinum or gold needles. This is the simplest method. Dissolution from these metals is practically negligible.

2. By the use of adrenin pledgets kept under the lid for a few minutes, instead of subconjunctival injections. These have practically as pronounced a mydriatic effect as injected adrenin, but may be contraindicated in some cases.

3. By allowing the adrenin to come in contact with the needle for as short a time as possible, if only steel needles are available. A clean needle full of normal salt solution may be first introduced through the conjunctiva, after which the syringe is attached to it and the solution quickly injected.

5 Bay State Road.

CATARACT EXTRACTION BY THE UNDETACHED CONJUNCTIVAL BRIDGE METHOD AFTER PRELIMINARY IRIDECTOMY

Fifty-four operations

RODERIC O'CONNOR, M.D.
SAN FRANCISCO

The writer believes that the cataract patient is entitled to the use of the safest method of extraction and to the benefit of all known safety precautions in all operations. He advocates the method described in the title stating that even an occasional operator can secure by it results equal to the most expert, if he is surgically fitted to operate at all. To establish this he compares his results in fifty extractions with those of Dr. Arnold Knapp, an operator of vastly greater experience and, presumably, of correspondingly greater skill. Comparative statistics are appended as to mechanical mishaps and postoperative complications. The visual results show 18 percent more patients with 20/20 or better. Read at the annual meeting of the Chicago Ophthalmological Society on January 15, 1934.

A patient is entitled to have his cataract removed by that method which gives him the best chance to obtain useful vision with the least operative risk. This cannot be emphasized too strongly. I hope to prove that the method described in the title is the one and that in using it the operator knows that he is doing his best to prevent mishaps and to minimize any possible bad results. I feel that the above statements are proved by the fact that, in my series, there was but one failure. That patient, without my permission, attended a "wake" on the twelfth post-operative day and something happened that resulted in a subconjunctival protrusion of vitreous.

The patient and his general medical adviser should not be misled into the belief that immature cataracts can be safely removed only by an intracapsular method. Such is not the case for even clear lenses are removed in high myopia. Nor should the patient be made a subject upon whom a spectacular operation is done simply to show that the operator can go through the necessary maneuvers.

Dr. Arnold Knapp in a report of a fourth hundred of operations by his method mentions two disadvantages: 1. The chance of capsular rupture which requires completion by the capsulotomy method or the removal of capsular remnants depending on the time at which the rupture occurs. 2. The complications that are "liable to occur and for which the operator must be prepared."

To the unprejudiced the question at once occurs: Why use a method that can be completed in only about one half of the attempts and in which complications are "liable to occur"? Especially so when one considers another statement; namely, that the method is suited only to "certain cases which are selected according to the type of cataract, absence of complications, and the behavior of the patient." In another paper reporting his second hundred of operations he again emphasized that the method is suited "only to tractable patients." But how can the tractability of a patient be determined with certainty before operation? In my opinion only by a preliminary iridectomy. Most patients who behave well at that operation will do so at the extraction. In several instances I have refused to extract because of bad behavior at the iridectomy.

Many, in fact most, intracapsular operators emphasize, in their writings, the need for "exceptional skill and experience," from which the reader is free to infer that capsulotomy operators are inferior in both respects. Here may be an explanation for the present trend toward intracapsular methods—a natural desire not to be considered inferior.

Also there seems to be something about those methods that calls for undue publicity for the operator as well as the operation. This is not so common as when the Smith-Indian method was occupying the spotlight. Patients usually go to the operator of whom they

hear the most and, even when results are bad, feel that they have had the best in their locality.

Mention should be made of the only intracapsular operator who had a perfect record. He had his operating outfit removed, or maybe thought it best not to push his luck, because he quit after the second operation. This was the bull which gored a farmer in each eye, but not at the same operation, with perfect intracapsular expressions on each occasion.

My hope is to "do my bit" to stem the present tide toward those methods, all of which, in my opinion, are surgically incorrect in that they remove the transverse diaphragm that protects the vitreous. Because of this any mishap is much more likely to be attended by serious results, chiefly vitreous loss and its consequences. The maneuvers necessary to break the zonular ligament, tumble the lens, and so forth, are certainly added traumatisms, as compared with removal of the anterior capsule and lens substance without disturbing the deeper structures.

In reporting this account of my personal experiences I have no desire to set myself up as an authority. My purpose is to prove that any operator, even the infrequent, can secure excellent results if he possesses the following qualifications:

1. Surgical sense and the will to use it.
2. Manual dexterity and coördination.
3. The will to select and use a safe method.
4. A desire to use all of the safety precautions in all operations.

Surgical sense usually comes with experience but not unless one is able to profit by one's own mistakes. Theoretically, one should be able to learn from the mistakes of others but there is no excuse for a failure to do so from one's own. To illustrate: I needed but one vitreous expulsion, due to my error in judgment of the patient's "tractability," to convert me to routine preliminary iridectomy. One may perform an operation hundreds or thousands of times and become "exceptionally skillful" but, if the operation is unsafe or surgically incorrect, and therefore liable to complications, nothing has been learned except how to use the hands. In this connection comes to mind the great ado when Col. Smith did his fifty-thousandth operation. The published records of his work in this country in 1921 proved that something more is needed than the experience of having done so many operations.

Manual dexterity and coördination cannot always be acquired—they are not simple. Notice how few of all who play at golf score well. Too many operators steady themselves by the eye, as poor horsemen hold themselves in the saddle by riding the bit. We all have seen men try to operate when, so far as hand control was concerned, they were fitted to handle nothing more delicate than a carving knife. In this connection two thoughts come to mind:

(a) No one is justified in making a cataract incision except with his master hand.

(b) One who practices ophthalmology is not necessarily an ophthalmic surgeon. Ophthalmic surgery should be looked upon as having the same relation to general surgery as the latter bears to medical practice. It is, possibly, for this reason that ophthalmic surgery has so many procedures that violate surgical principles. Examples are tendon ligation in certain tucking operations and the destruction of binocular functions by certain kinds of tenotomies.

Selection and use of the safest method should not be a question of opinion. Results in different methods by men of equal operative ability should settle this point. The weakness of this idea is the ease with which reputation and ability can be confused. I have decided to prove my claim by going about it the other way around; namely, by comparing my results with those recently given by Dr. Arnold Knapp in a fourth series of one hundred extractions by his method.

I have selected Dr. Knapp's statistics for three reasons: (a) Because from the way in which he goes into detail con-

cerning the complications it is quite evident that he is trying to show the whole truth. (b) Because, in my opinion, his method is the best of the intracapsular. (c) Because I had the pleasure of seeing him do a number of his operations when I was in New York, in 1914, trying to interest the ophthalmologists in my cinch shortening. I cannot imagine a more skillful operator and therefore feel that any bad result he may have must be due to the method.

Following the last idea, no one will credit me with having a fraction of his skill and experience and will therefore be inclined to give credit to the operative plan should my results compare favorably with his. I might as well add that they do or there would be no indication for this paper.

Safety precautions (including the technic of the operative plan). All should be used in all operations. Occasionally a discusser is heard to say that he uses preliminary iridectomy only in the one-eyed. Such a man, by that statement, convicts himself as unfit to operate because if he thinks that an iridectomy adds to the safety, he should use it in the two-eyed also.

The operative plan is as follows: (a) Preliminary iridectomy is performed in order to become acquainted with the patient under fire, to have completed the one part of the operation that might be painful and so serve to start misbehavior, to reduce the incidence of iritis and prolapse, to shorten the time at extraction, and to prove to the patient that the affair is not so terrible, after all. The iris is then kept at rest by atropin till the extraction is made. The iridectomy incision is made just in clear cornea, using a 3-mm. keratome, in order not to interfere with the cataract incision. Butyn is used in order to have an undilated pupil. With fine iris forceps the pupillary margin of the iris is drawn just out of the incision and cut by an upward snip. This gives a beautiful keyhole effect so that, when the upper lid is in its usual position partially over the cornea, the optical effect is almost equal to that of a simple extraction.

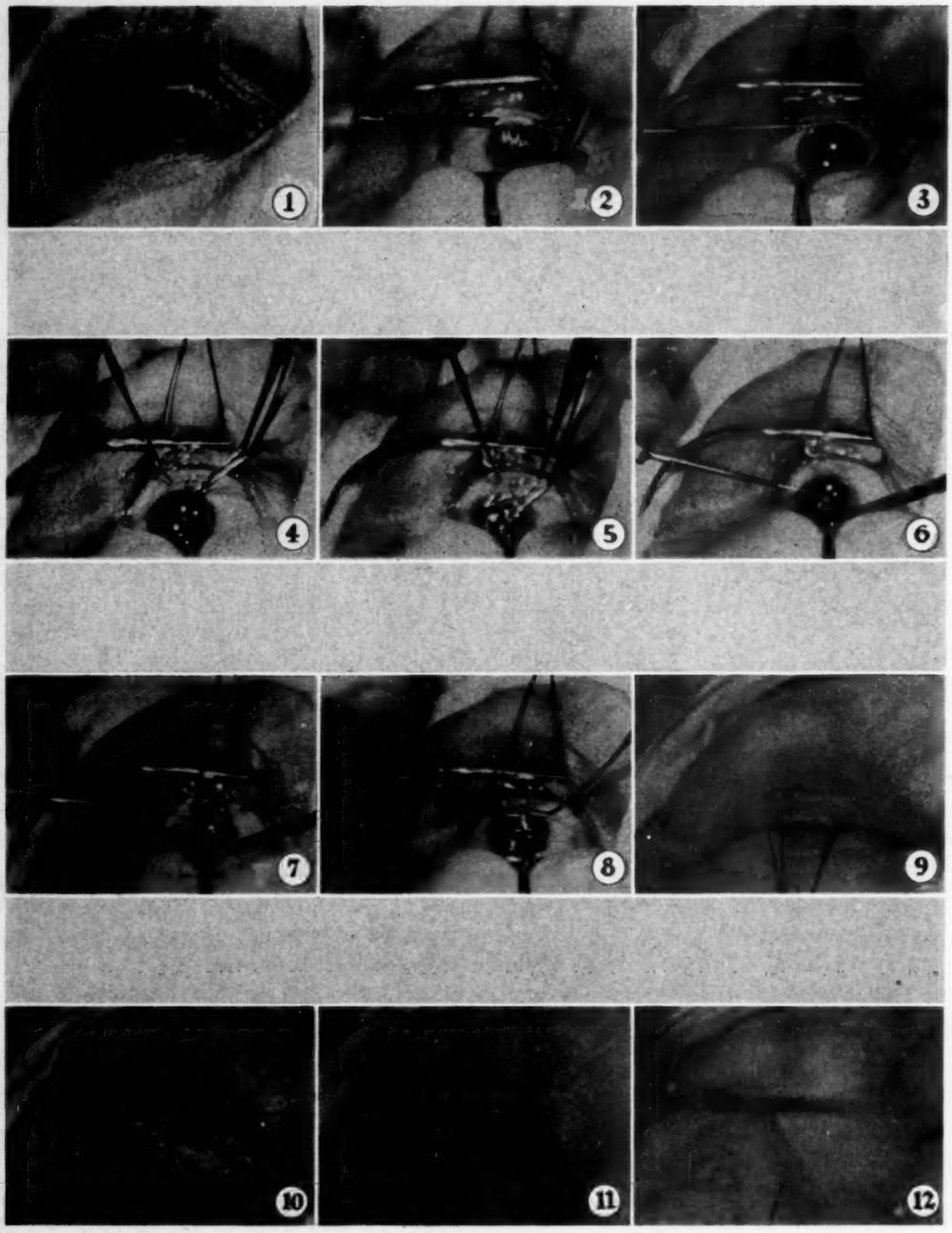
(b) Akinesis should be routine. My one case of vitreous expulsion occurred before this was standard practice. I am glad to note that Dr. Knapp does not believe in the routine use of retrobulbar anesthesia. There should be no pain at the extraction, if preliminary iridectomy has been used, and that procedure cannot affect the patient's mental control. Complications have been reported, even as serious as cavernous-sinus thrombosis, from orbital injections and I can see no reason for any unnecessary risks.

(c) Upper-lid sutures (fig. 1). Two are used, spaced in the middle of each half of the upper lid. They include the skin only and are placed just above the lash line. The ends are arranged to give an even lift and grasped by a hemostat which is dropped over the top of the head. In many instances this gives all the needed lift and no elevator is required. They permit perfect control in closing the eye after operation and are then fastened to the cheek by adhesive plaster thus holding the temporarily paralyzed lids in apposition. They also afford perfect control at the dressings, as lid lifters, making it unnecessary even to touch the lids.

(d) A tractor suture is placed below the cornea to prevent downward rotation in patients in whom the bridge has been inadvertently cut or in whom it cannot be used. Gentle traction on this by the assistant helps to keep the lips of the corneal incision from gaping. For that reason I think it better than the superior-rectus suture.

(e) Speculum. I never use one. When operating on the right eye I use a right-side Green elevator because its holder is out of the way while the incision is being made. For the left eye an ordinary Des Marre retractor is sufficient as I stand at the patient's right side and use the right hand. I like this position so well that, if I had equal coördination with my left hand, I would operate on the right eye from the patient's left side.

(f) The incision is practically an upper half, winding up with a bridge about 4 mm. wide. It cannot be made in a slapdash way and it must come through the sclera with great care (fig. 2). The blade is then turned and carried parallel to



Figs. 1-12 (O'Connor). Steps in cataract extraction.

the globe for about six millimeters (fig. 3). Sometimes the secondary knife replaces the pointed for this maneuver and at others the bridge must be made with forceps and scissors. Occasionally it must be made before the corneal incision, especially in deep-set eyes and those with narrow fissures. But it is well worth the doing and, even at the worst, cannot equal the trouble of inserting conjunctival or sclero-corneal sutures. The usual objection to the

bridge is that it makes more difficult the iridectomy and the lens expression. Preliminary iridectomy solves the first objection and the following maneuver solves the second: I use a tortoise-shell spatula so flexible that the amount of pressure can be seen as well as felt. Only enough pressure is made over the lower part of the cornea just to start a bend in the spatula. This should cause the upper edge of the lens to bulge the bridge and to show on each side. A Fisher needle is now inserted into the lens on one side of the bridge (fig. 6) and used to lift the lens out from under the other side (fig. 7). During this procedure only enough pressure is maintained with the spatula to keep the lens from falling back. In this way the lens is extracted not expressed, which, in my opinion, accounts for the low incidence of vitreous loss. If the lens does not present on this slight pressure I go back with the Kalt forceps for a larger bite of anterior capsule (figs. 4, 5). I keep the biting edges of my Kalt forceps as sharp as possible. If, by chance, the Kalt forceps fails, the lens capsule is opened with a cataract knife as advised by Jackson. The removal of a large piece of capsule certainly reduces the necessity for needling later on.

The bridge is far superior, in my opinion, to the various kinds of sutures because it is present as a safeguard throughout the operation, while sutures come into use after the operation is completed or after some mishap has occurred. In this connection the old proverb about "an ounce of prevention" is *à propos*. The bridge supports the incision when the patient looks down and permits the operator to take advantage of that position should the need arise during the operation. It also prevents the ruinous insertion of the upper lid under the cornea. I am confident that it reduces the degree of postoperative astigmatism.

(g) Irrigation (fig. 8) is now done to remove cortical matter and it can be done more thoroughly because of the presence of the bridge. This is far safer than the scoops, buckets, etc., we read about for this purpose. It has been my experience that soft cortex rarely causes any undue reaction. It occurred only once in my series, which is hardly frequent enough to warrant the risks of an intracapsular operation.

(h) The iris pillars are replaced and the upper lid lifted down into contact with the lower. The patient is told to keep both eyes closed as though asleep and the upper-lid sutures are fastened to the cheek with adhesive (fig. 9).

(i) Dressing. An excess of a bland ointment (fig. 10), such as merthiolate, is squeezed over the lashes and lid margins. This makes the first dressing very easy. Seldom is there need to do any more than wipe it way and lift the lid with the tractor sutures to see the condition of the eye. For illumination I use the marginal flare from a flash-light beam. Over the layer of ointment is placed a single thickness of gauze (fig. 11) and a cotton dressing carefully built up (fig. 12), using small wisps, to fill in the space under the brow and to the side of the nose—this to prevent any flat pressure on the globe. Two strips of one-inch adhesive tape fastened diagonally hold this dressing in place. The other eye is covered and over all a stonecutter's wire mask is placed, which is worn for three weeks to prevent accidental injury by blows of any kind.

(j) Subsequent dressings are made on the fourth day when the unoperated eye is left open and on the seventh when both are uncovered. The patient is walked about from the fourth day and goes home, usually, on the eighth.

(k) Last, but far from the least, is the knife. The importance of its being perfectly sharp both as to point and edge cannot be emphasized too much because it is probable that many an eye has been lost by the drag of a dull blade and its consequences. I learned to sharpen my knives when working in Manila in 1907-8, and -9 and never trust a knife, even out of the sealed container. It is well known that edges do not stay sharp even though unused. When getting my instruments ready for operation, I see that two knives are in perfect condition as to point and edge and permit no one to touch them but myself. Thin chamois is used for testing and if

Table 1

DATA OF FIFTY-FIVE OPERATIONS

Case No.	Eye	Mechanical Results	Visual Results	Remarks
1	L	Excellent	20/20 −	Patient was a diabetic; had had double glaucoma for which a number of operations had been done, in the early stages by Harold Gifford; in the later, by me. Removal of the cataracts was complicated by the present of synechiae, trephine scars, and blebs.
2	R	Excellent	20/40 −	
3	L	Excellent	L.P.	Case of old binocular annular synechiae with organized pupillary exudates. Only hoped to get enough vision to aid in getting about, and was successful to that extent in the right eye.
4	R	Excellent	Large objects	
5	L	Excellent	20/60 +	Media in each eye were beautifully clear. Poor vision due to myopic macular changes.
6	R	Excellent	20/60 +	
7		Excellent	20/50	Diabetic with macular changes.
8		Excellent	L.P.	Extensive retinal degeneration. Gets about.
9	R	Excellent	3/65	Extensive macular atrophy. Other eye operated on later with 20/20 − result.
10	R	Excellent	20/40	These three were clinic cases operated on for a friend who did not report the final visual result. The two given were at the end of the healing period.
11	L	Excellent	20/50	
12		Excellent	??	
13	L	—	20/20	Was not able to complete extraction because of uncontrollable circular motion of the eye. Think that bridge saved the eye. Removal of cataract was completed by discissions with vision noted, although patient was over 60 years of age. This case is included because it is proof that the "tractability" of a patient cannot be foretold. He had behaved perfectly at iridectomy and also later at removal of the cataract from the other eye.
14		Excellent	0	Traumatic cataract with steel in the vitreous. Later attempt to remove by magnet failed. Four years later panophthalmitis called for enucleation. Included only for the mechanical result of extraction.
15	L	Excellent	20/20 −	
16		Excellent	20/20 −	Ninety-two years of age.
17		Fair	20/20 −	Slight incarceration of outer pillar. Behaved so badly it was thought best not to attempt replacement. Therefore not a prolapse.
18		Excellent	20/20 +	
19		Excellent	20/16	
20		Excellent	20/25 −	Faint membrane, not worth needling.
21		Excellent	20/16	Vision given is that two years after operation, at which a tiny bead of vitreous was lost. Striped keratitis. No updrawn pupil.
22		Excellent	20/20 −	Eighty-one years of age. Central vision of other eye lost from macular hemorrhage. Similar occurrence in this eye about a year later.
23		Excellent	20/20 −	Macular myopic changes. Myopia of 15 D.
24		Excellent	20/16	
25		Excellent	20/20 −	Patient behaved badly. Feel that bridge saved the eye.
26		Excellent	20/16	
27		Excellent	20/20 −	
28		Excellent	20/16 −	Postoperative delirium. On second night patient got out of bed and ran about hospital. All dressings removed. No harm done.
29		Fair	20/20 −	Misbehaved at iridectomy causing large iridodialysis. No trouble at extraction. Eye might have been lost at combined extraction.
30		Excellent	20/20 −	Eighty-two years old. In spite of excellent result, went elsewhere for operation on other eye and lost it after a prolonged convalescence.
31		Excellent	20/50	Pupillary membrane. Refused needling. Illiterate.
32		Excellent	20/20 −	Small vitreous opacities.
33	L	Excellent	20/20 −	Other eye was listed above with 3/65 vision.
34		Excellent	20/20 −	Was not satisfied with the result!

Table 1 (Continued)

Case No.	Eye	Mechanical Results	Visual Results	Remarks
35		Excellent	20/25	Only patient who had reaction due to cortical absorption.
36	R	Excellent	20/20	Diabetic. R.E. had a large corneal scar from old ulcer. Six months after second operation patient jumped from an elevation of four feet, landing heavily, causing immediate bilateral retinal detachments.
37	L	Excellent	20/16−	
38	R	Excellent	20/20	Had to back out of operation on other eye.
39		Excellent	20/13	
40	R	Excellent	20/20+	Vision noted is that 3 years after operations.
41	L	Excellent	20/20+	Patient was 81 years of age.
42	R	Excellent	20/20−	Patient behaved badly, worse at the second operation. Think that the bridge saved the eyes.
43	L	Excellent	20/20+	
44		Excellent	20/16−	Case of lenticular myopia ending in cataract.
45		Excellent	20/25−	Later another operator tried an intracapsular operation on the other eye with total loss resulting.
46		Bad	20/150	At completion of "toilette" the vitreous bulged the bridge but none was lost. Healed normally and went home on the 8th day. Eye was practically white the morning of the 12th day. That night the patient attended a "wake" and two days later reported with a subconjunctival protrusion of vitreous. Pressure bandage for one week, by which time the vitreous had returned to place and the scar was flat. Vision at 4 months was 20/30, but it gradually failed from membrane formation in the vitreous. This case shows that undue disturbance of the vitreous may cause trouble even though none be lost.
47		Excellent	20/16	
48		Excellent	20/20	Japanese. Canthotomy necessary.
49		Excellent	20/40	Needling of pupillary membrane not done because patient was illiterate. Operation made difficult by a marked lateral head tremor.
50		Excellent	20/20	Patient behaved badly, difficulties increased by head tremors.
51		Excellent	20/16+	
52		Excellent	20/16	
53		Excellent	20/16	
54		Excellent	20/30	Operated on at San Diego to demonstrate method; a simple extraction with a wide pupil. No trouble. Dr. Marsden reported vision tested at 10 weeks and said there were myopic fundus changes.
55		Excellent	20/40	Vision tested at 4 weeks. Too recent for final results.

any drag occurs along the edge or if the point is not sharp the strop, or hone, if necessary, is used till the trouble is corrected. A secondary knife with an equally sharp edge must be at hand *always*.

Results

It is with considerable hesitation that I have come to the point where results must be given because they are unbelievably good. A surgical operation, being a mechanical procedure, should be judged chiefly by its mechanical results. In the case of cataract extraction, the visual will parallel the mechanical, if the media are clear and the perceptive apparatus is in good condition. Often there is excellent vision in the presence of a poor mechanical result so the visual result does not tell the whole story. Therefore in my table results of both kinds will be noted. The first four listed had pathological complications as described under "remarks" and in these the excellent results were so considering the conditions that had to be dealt with. There were three instances in which I am not able to give the final visual result because the operation was performed at the clinic of a friend who overlooked letting me know. There were five cases with more or less degenerative changes in the macular region and one with steel in the vitreous.

The extraction was done as a preliminary to removal of the steel, the presence of which did not interfere with a satisfactory mechanical result. One patient behaved so badly after the completion of the incision that I had to "back out" (as Harold Gifford called it) and complete the removal of the lens by discissions with a final visual result of 20/20 pt., although the man was over 60 years of age.

The table shows that a number behaved so badly that, in my opinion, the bridge prevented serious mishaps.

Needling was done in 11 eyes and in a few more would have improved the vision. It was not done in those because several had excellent reading vision and two were illiterates, which removed the indication. I cannot understand the fear of this little operation as I have done it a great many times in my total cataract experience, so far without a single bad result. To fear it and favor an intracapsular extraction to avoid it smacks of "straining at gnats and swallowing camels." If pupillary membranes are tough I always use the Noyes scissors to cut them and so avoid drag on the iris and ciliary body. My pair is so delicate that it can be used through the puncture of an ordinary cataract knife. This puncture should always be made subconjunctivally.

There are 54 completed operations in which mechanical results can be given and 39 uncomplicated ones in which comparison of visual results can be made with Dr. Knapp's 78. The mechanical result of my last operation is known but it is too recent to give the final vision.

Complications

Operative. There were only three, as follows:

One. At the preliminary iridectomy the man jerked, causing a large iridodialysis. The same action in a combined extraction might have caused serious results. He behaved well at the extraction and wound up with 20/20 part.

Two. One iris pillar was purposely not replaced because of the patient's bad behavior. I preferred the risk of future trouble from incarceration to the immediate one of vitreous loss. It never caused trouble.

Three. In this there was a "bead" loss of vitreous. It was so small that when seen last, two years later, there was no updrawing of the pupil and vision was 20/16.

Post-operative. There were but three.

One. There was undue reaction attending absorption of cortical matter. It cleared up with final vision of 20/25.

Two. One case of striped keratitis which cleared up quickly. As a coincidence it happened in the one who had the vitreous loss.

Three. One of subconjunctival protrusion on the 12th day. The incision had apparently healed and the eye was white. The old lady had removed the mask and attended a "wake." The excitement was too much for the eye. A pressure bandage promptly flattened out the protrusion and for a time the vision was 20/30 but vitreous opacities appeared and increased. This case shows that even a vitreous displacement with no loss may result badly.

Summary

Mechanical. There were only three that were not perfectly satisfactory. These were the incarceration, the iridodialysis, and the late vitreous protrusion and of these only the last named did harm.

Visual. The general table shows the results in all operations. Table 3 shows those in 39 uncomplicated cases in comparison with Dr. Knapp's 78. In table 2 is shown comparative results, as regards operative and postoperative complications, with Dr. Knapp's. It must be remembered that he is reporting 100 operations to my 54.

How intracapsular operators, and especially Dr. Knapp, can publish such a list of complications and still persist in the belief that it is the best operation is, to me, incomprehensible. It makes one wish for a report of their results by the capsulotomy method. Moreover their intracapsular cases are selected as "specially suitable" while the "good-old-dog" method has to take the rest even to finishing about half of those started as intracapsular.

Table 2

COMPARATIVE TABLE OF OPERATIVE COMPLICATIONS

	Knapp	O'Connor
Hyphemia	11	0
Prolapse of iris	4	0
Loss of vitreous	5	1 (tiny bead)
Late prolapse of vitreous	4	1 (traumatic)
Retinal detachment (due to operation)	2	0
Deep keratitis with secondary glaucoma	2	0
Glaucoma	5	0
Iridocyclitis	1	0
Incarcerated iris pillar	no mention	1 (intentional)
Needlings	0	11
Iridodialysis	0	1 (vision 20/20)
Reaction accompanying cortical absorption	0	1

This table proves that Dr. Knapp was right in mentioning as a disadvantage of his method "the complications that are liable to occur and for which the operator must be prepared." It must be noted that he is reporting 100 operations to my 50, because four of mine could not have been operated on by his method.

Table 3

COMPARATIVE TABLE OF VISUAL RESULTS IN UNCOMPLICATED CASES

(Dr. Knapp did not give visual results in his 22 complicated cases)

Vision	Knapp	O'Connor	Remarks
20/20 or better	51 = 66.8%	33 = 84.6%	
20/30 or better	27 = 33.2%	4 = 10.3%	
20/40		1	Two of these six were illiterate and there was no need to improve the vision. Several more could have been improved but were satisfied, having good reading vision.
20/50		1 = 5.1%	
Totals	78	39	

From this table it is quite apparent that the intracapsular operation is not essential to excellent visual results.

450 Sutter Street.

CHLORINE CONTENT OF AQUEOUS, VITREOUS, AND SERUM

A comparative study on oxen

P. W. SALIT, PH.D.
IOWA CITY, IOWA

Chlorine determinations in aqueous, vitreous, and serum were carried out in calves, 4-6 weeks old, and in adult oxen, 2-4 years old. The results in terms of averages are as follows: In calves, the chlorine content in aqueous, vitreous, and serum was 401.8, 403.7, and 351.0 mg. percent, respectively; in adult cattle it was 408.2, 418.7, and 351.7 mg. percent, respectively. It appears that age, within the limits of 4 weeks and 4 years, has practically no effect on the chlorine concentration of aqueous, vitreous, and serum of oxen. Aqueous and vitreous are similar with respect to their chlorine contents and contain about 16 percent more chlorine than does serum. From the Department of Ophthalmology, College of Medicine, State University of Iowa.

In 1922 Ascher[1] published data from comparative studies on the sodium-chloride content of human aqueous, vitreous, spinal fluid, and serum. The values in terms of milligrams per 100 gm. of fluid are as follows: aqueous 698, vitreous 670, spinal fluid 708, and serum 552. When these figures are multiplied by the factor 0.60667, the respective chlorine values are 423.5, 406.5, 429.5, and 334 mg. per 100 gm. According to Duke-Elder's[2] publication in 1927, the sodium-chloride contents of rabbit aqueous, arterial plasma, and venous plasma are 641, 590, and 551 milligrams percent, respectively, representing chlorine values of 388.9, 357.9, and 334.3 milligrams percent. In the same year Tron[3] reported his studies on the chlorine content of aqueous, vitreous, and serum of ox eyes. He found the chlorine content of aqueous to be 437 mg. percent, that of vitreous 441 mg. percent, and that of serum 366 mg. percent. In 1929 O'Brien and Salit[4] made comparative sodium-chloride studies on the aqueous, vitreous, and lens of ox eyes. From their sodium-chloride figures (714, 682, and 187-340 mg. percent, respectively) we obtain by calculation 433.2 mg. percent chlorine for aqueous, 413.7 mg. percent for vitreous, and 113.7-206.3 mg. percent for the lens.

The above data show that in all cases both the aqueous and vitreous, within the range of experimental error, are alike with respect to chlorine content and contain more of this ingredient than does serum. Most of the above experiments, however, were carried out on extremely small quantities of material and with no reference to the age of the experimental animal. Furthermore, Ascher and Tron measured the quantities of fluids gravimetrically while others used the volumetric method. Hence it was considered desirable to check the results once again, employing relatively large amounts of fluids, and to study the chlorine content with respect to age.

In the present study chlorine determinations were carried out on the aqueous, vitreous, and serum of calves (4-6 weeks old) and adult cattle (2-4 years old). The aqueous was obtained with a small graduated, well-oiled syringe, while the vitreous, after its removal through an incision in the pos-

Table 1

MINIMUM, MAXIMUM, AND AVERAGE CHLORINE VALUES OF AQUEOUS, VITREOUS, AND SERUM*

Animal	No. of animals	Aqueous mg.%	Vitreous mg.%	Serum mg.%
Calves (4-6 weeks)	4	384.0-416.0	390.0-421.9	338.6-354.5
Averages		401.8 (4)	403.7 (8)	351.0 (8)
Adult cattle (2-4 years)	10	291.0-432.5	413.0-427.7	333.3-394.3
Averages		408.2 (16)	418.7 (18)	351.7 (16)

* Figures in parentheses indicate the number of analyses.

terior part of the bulbus, was collected in a large test tube and filtered. The analyses were carried out by the method of Wilson and Ball[5]. In calves, the combined aqueous of both eyes (1.8-2.0 c.c.) was used in each analysis, while in adult cattle the aqueous of each eye (1.5-2.0 c.c.) was analyzed separately. In the analyses of vitreous and serum, 2 c.c. of fluid were used.

The results of this study corroborate the findings of previous investigators. The chlorine contents of aqueous and vitreous are practically the same and appreciably higher than that of serum. Age apparently has little or no effect on the chlorine content of aqueous, vitreous, and serum of ox eyes. For calves the chlorine averages up to 401.8 mg. percent in aqueous, 403.7 mg. percent in vitreous, and 351.0 mg. percent in serum; for adult cattle the respective averages are: 408.2, 418.7, and 351.7 mg. percent.

Bibliography

[1] Ascher, K. W. Zur Chemie des menschlichen Kammerwassers. Arch. f. Ophth., 1922, v. 107, p. 247.

[2] Duke-Elder, S. W. The biochemistry of the aqueous humour. Biochem. Jour., 1927, v. 21, p. 63.

[3] Tron, E. Chemische Untersuchungen über die Natur der intraokularen Flüssigkeiten. II. Magnesium, Natrium und Chlor im Kammerwasser, Glasskörper und Blutserum des Ochsens. Arch. f. Ophth., 1927, v. 118, p. 713.

[4] O'Brien, C. S., and Salit, P. W. The chemical constituents of the aqueous, vitreous, and lens. A comparative study on animal eyes. Extrait du Compte-Rendu du XIII Concilium Ophthalmologicum Amsterdam—Den Haag, Sept., 1929; Amer. Jour. Ophth., 1931, v. 14, p. 582.

[5] Wilson, D. W., and Ball, E. G. A study of the estimation of chloride in blood and serum. Jour. Biol. Chem., 1928, v. 79, p. 221.

NEWER KNOWLEDGE OF BACTERIOLOGY APPLIED TO OPHTHALMOLOGY

G. HOWARD GOWEN, M.D.
CHICAGO

Rough colonies (R) are commonly isolated from skin surfaces around the eye. These R colonies are mutants of the smooth (S) staphyloccoccic colony normally recovered. Because the S-to-R change is usually an attenuation phenomenon, experiments were performed to see whether the degree of S-to-R mutation on the eyelids would explain the absence of pathological conditions of the lids of some persons and their presence in others. In ten normal subjects who had never had any pathological condition of the lids, the recovered organism was Staphylococcus epidermidis-albus and the average percentage relationship of R to S was R 30 and S 70. In six abnormal subjects, who were predisposed to styes and furuncles, the recovered organism with Staphylococcus aureus in five cases and staphylococcus citreus in one, and the percentage relationship of R to S was R 2 and S 98. When there was a predilection of one side over the other to infection, the R percentage was low on the affected side and considerably higher on the side that was seemingly immune. In subjects who recovered rapidly and spontaneously from styes, there was an associated high percentage of R colonies. In those who recovered rapidly, the presence of Staphylococcus aureus resulted in a high number of R colonies and with the return of the flora to Staphylococcus epidermidis-albus the percentage of R colonies decreased. A high percentage of R colonies from the skin around the eye seems to be associated both with freedom from pathology and with rapid recovery if pathology does occur. From the Department of Bacteriology and Preventive Medicine, the University of Illinois College of Medicine, the Research Laboratories of the State Department of Public Health, and the Chicago Medical School.

While working on experiments dealing with the source of Staphylococci in the normal conjunctiva, which have previously been reported[1], rough colonies (R) were frequently recovered from the skin surfaces around the eye. The role of the rough colony in bacteriological investigation has been conceded to be, in most cases, that of a nonvirulent mutant of the smooth (S) type[2]. This smooth-to-rough change is being more and more thought of in terms of an immunologic response with a resultant defensive mechanism[3]. That the change from S to R is an attenuation phenomenon was early voted by Pasteur[4]. The evidence brought forward by subsequent observers such as de Kruif[5], Gotschlich[6], Reddish[7], Steinhardt[8], Bordet and Sleeswyk[9], Cowan[10], Hadley[11], and others has placed this fact on a generally accepted basis. Some of the criteria advocated by Hadley[12] as being in general characteristic of the R-mutant type are as follows:

1. Colonies rough, irregular, and flat.
2. Agglutinative type of growth in broth.
3. Expansive growth on agar.
4. Colonies on agar translucent and more difficult to pick off.
5. Secondary colonies seldom occur.
6. Biochemically inactive.
7. Morphology atypical.
8. Loss of motility in motile species.
9. No capsules.
10. More common in carriers and convalescents.
11. More susceptible to phagocytosis.

Study of the R colonies recovered from the eyelids of five individuals was made. The characteristics of these R types were in accordance with the first seven listed above, which were the only ones applicable. Therefore, it may be assumed that the R colonies obtained from the skin regions around the eye are mutants of the normally smooth staphylococcic type. That the degree of S-to-R change on the eyelids might partially explain the absence of inflammatory conditions in certain cases, and their presence in others, suggested the following experiments, which were performed on subjects with normal lids and on others with inflammatory conditions of the lids.

Ten normal subjects were chosen for the initial procedures. The basis of classifying them as normals was that they must never have had, to their knowledge, any pathological condition of the eyelids or of the skin intimately related to the eye. The sites of culture were

as far as possible those naturally occurring anatomical regions illustrated in the following diagram.

In the cultural work plain agar was used. Sterile cotton swabs, 3/8 x 1/8 inch, moistened with sterile normal saline, were employed for removing the organisms from the skin. The media were seeded by evenly rotating the swab across the entire plate. The area from which cultures were made in regions 1, 2, 3, 4, and 5 was one-fourth inch in diameter and extended across the entire lid. The area from which cultures were made in regions 6 and 7 was one-fourth inch square. The cultures were incubated for 24 hours at 37°C. At this time the percentage relationship of R to S

Table 1

AVERAGE OF R AND S COLONIES RECOVERED IN THE SEVEN SELECTED REGIONS AROUND THE EYE IN TEN CASES

Region	R%	S%
1	27	73
2	9	91
3	33	67
4	13	87
5	7	93
6	22	78
7	18	82

colonies was determined by examination of the plates under the low-power lens of the microscope. The plates were divided into quarters, twenty-five consecutive colonies were counted in each quarter, using separate columns for the R and S, and then the four counts were totaled, giving the number of R and S per hundred colonies and a fairly accurate percentage relationship of the entire plate.

The results in table 1 would seem to indicate that the factor influencing the change from S to R is more potent near the lid border than away from it. In table 2 it is seen that although the percentage relation of S to R colonies varies considerably in normals, it is of constant occurrence. As to why this S-to-R change occurs, one must revert to the present knowledge concerning the autodisinfecting mechanism of the skin. Johnson and Arnold[13] definitely showed that in an acid stomach viable organisms are rendered nonviable. Arnold, Gustafson, et al.[14] found the reaction of the skin to be pH 5 to pH 5.7. Arnold and Singer[15] noted that within ten

Fig. 1 (Gowen). Diagram showing regions from which cultures were made. 1. Border of upper lid; 2. Upper fold; 3. Border of lower lid; 4. Between border of lower lid and lower fold; 5. Lower fold; 6. Inner corner; 7. Outer corner.

minutes a 90-to-95-percent reduction occurs in organisms applied to the normal clean skin surface, and Arnold, Gustafson, et al.[14] reported that with thirty minutes a 99-to-100-percent reduction occurs. This mechanism must also be true in regard to the endogenous flora of the skin, otherwise the skin surfaces would be overgrown with Staphylococci to an unestimable degree. It would seem reasonable that the S-to-R mutation may play an important part in the self-disinfecting activity of the skin and may be due, in part, to the acid reaction of skin surfaces.

Table 2

AVERAGE OF R AND S COLONIES RECOVERED IN THE SEVEN SELECTED REGIONS IN EACH OF TEN NORMAL CASES

Case	R%	S%
1	29	71
2	27	73
3	4	96
4	13	87
5	33	67
6	8	92
7	15	85
8	28	72
9	26	74
10	9	91
Average	19	81

Another possible factor that must be considered in this S-to-R change is the lysozyme of Fleming which is present in rather large amounts in tears[16]. The skin border, one eighth of an inch in diameter, just below the lower eyelash, is normally frequently moistened with lacrimal secretions, due to the action of nictitation, whereas the skin of the up-

Table 3

PERCENTAGE OF R AND S COLONIES RECOVERED IN EACH OF TWELVE ABNORMAL CASES

		R%	S%
Case 1—Miss W.			
Organism: Largely Staphylococcus citreus.			
Complaint: Recurring small furuncles occurring anywhere on the face, with no special area of predilection.	L. Upper Lid	0	100
	L. Lower Lid	0	100
	R. Upper Lid	0	100
	R. Lower Lid	0	100
Case 2—Mrs. J.			
Organism: Staphylococcus aureus.			
Complaint: Scaling, redness, and slight induration of all of the lids for one month.	L. Upper Lid	2	98
	L. Lower Lid	0	100
	R. Upper Lid	0	100
	R. Lower Lid	0	100
Case 3—Dr. W.			
Organism: Staphylococcus aureus.			
Complaint: Generalized acne of the face.	L. Upper Lid	0	100
	L. Lower Lid	0	100
	R. Upper Lid	0	100
	R. Lower Lid	0	100
Case 4—Mr. S.			
Organism: Staphylococcus aureus.			
Complaint: Generalized furunculosis of the entire face.	L. Upper Lid	3	97
	L. Lower Lid	0	100
	R. Upper Lid	1	99
	R. Lower Lid	0	100
Case 5—Mr. S.			
Organism: Staphylococcus albus.			
Complaint: Styes, recurring, always involving the left eye only. The last one occurred one year ago.	L. Upper Lid	0	100
	L. Lower Lid	6	94
	R. Upper Lid	12	88
	R. Lower Lid	12	88
Case 6—Mr. Z.			
Organism: Staphylococcus aureus.			
Complaint: Recurring styes, usually on the right eye; occasionally on the left.	L. Upper Lid	4	96
	L. Lower Lid	8	92
	R. Upper Lid	6	94
	R. Lower Lid	4	96
Case 7—Mrs. K.			
Organism: Staphylococcus citreus on right side. Staphylococcus albus on left side.			
Complaint: Had one stye which occurred five years ago on the right side.	L. Upper Lid	6	94
	L. Lower Lid	14	86
	R. Upper Lid	0	100
	R. Lower Lid	0	100
Case 8—Mr. W.			
Organism: Staphylococcus albus on left upper lid, Staphylococci aureus and albus on the other three lids.			
Complaint: Styes occurring every summer.	L. Upper Lid	8	92
	L. Lower Lid	0	100
	R. Upper Lid	8	92
	R. Lower Lid	0	100
Case 9—Mr. G.			
Organism: Staphylococcus albus.			
Complaint: Scaling of the eyelids. This occurs at the outer corner, usually on the right side; occasionally on the left.	L. Upper Lid	16	84
	L. Lower Lid	18	82

Table 3 (Continued)

	R. Upper Lid	0	100
	R. Lower Lid	2	98
Case 10—Mr. K.			
Organism: Staphylococcus aureus.			
Complaint: Frequent small pustules around the hair follicles of the left eye. Was affected with a stye which began May 31, 1933, on left upper lid and disappeared by June 3.	June 2, 1933.		
	L. Upper Lid	0	100
	L. Lower Lid	50	50
	June 9, 1933.		
	L. Upper Lid	8	92
	L. Lower Lid	8	92
Case 11—Mr. J.			
Organism: Staphylococci citreus and albus.			
Complaint: Small furuncle occurring on the inner corner of the left upper lid. It disappeared in 3 days.	L. Upper Lid	26	64
	L. Lower Lid	14	86
	R. Upper Lid	28	72
	R. Lower Lid	14	86
Case 12—Mr. J.			
Organism: Staphylococcus albus.			
Complaint: Ichthyosis. Has never had styes.	L. Upper Lid	16	84
	L. Lower Lid	26	74
	R. Upper Lid	22	78
	R. Lower Lid	10	90

per lid does not normally come in contact with tears. The fact that R colonies can be recovered from the upper lid as frequently as from the lower lid would speak against any effect from this source. In further emphasis of the improbability of such an effect, Fleming and Allison[17] in an extensive report on lysozyme, cite no instance in which S-to-R mutation occurred as a result of the activity of this lytic agent. Work in our own laboratories has also failed to reveal any S-to-R changes brought about by lysozyme.

Having observed in the previous experiments that the S-to-R mutation is a constant finding on the skin surfaces adjacent to the eye in normal human subjects, and having noted the work by other observers, which seems to indicate that this is a part of a protective mechanism, a study was now made to see if this mechanism differed in the presence of pathological skin conditions associated with the eye, such as furunculosis, styes, and blepharitis. With the same technic as was described before, cultures were taken from the one-quarter-inch border of the upper and lower lids of both eyes of all the subjects. The cases selected comprised acute conditions, chronic, convalescent, and those in which several months had elapsed since the occurrence of an affliction. The results can best be illustrated by giving brief case reports as illustrated in table 3, and by discussing the closely related cases in groups.

Table 4

AVERAGE RELATION OF R TO S COLONIES FROM TEN NORMAL CASES SHOWING STAPHYLOCOCCUS EPIDERMIDIS-ALBUS

	R%	S%
L. and R. Upper Lids	27	73
L. and R. Lower Lids	33	67
Average	30	70

AVERAGE RELATION OF R TO S COLONIES FROM SIX ABNORMAL CASES SHOWING STAPHYLOCOCCUS CITREUS OR STAPHYLOCOCCUS AUREUS

	R%	S%
L. Upper Lid	3	97
L. Lower Lid	3	97
R Upper Lid	2	98
R. Lower Lid	1	99
Average	2	98

From cases 1 to 4 it can be seen that organisms were present on the skin which normally are not found there. In the presence of this abnormal flora, when culture was made, the R type of colony was in most cases not obtained

and if present at all occurred only in a very low percentage.

In cases 5 to 9, some rather interesting facts can be observed. When the pathological condition occurred on any of the lids, the R-colony percentage was low in all cases, as was indicated in cases 6 and 8. When there was a predilection of one side over the other, the R-colony count was low on the side usually affected and considerably higher on the side that was relatively immune.

In case 10 it was noted that the culture from the lid on which the stye occurred showed no R colonies. The lower lid on the corresponding side which yielded the same organism, namely, Staphylococcus aureus, but on which no stye occurred showed 50 percent R colonies. This would indicate that a degree of protection was afforded the lower lid which was absent in the upper lid. After convalescence it was seen in this case that the flora changed from Staphylococcus aureus to albus and that at this time rough colonies were obtained from the affected eyelid. In case 11 the lack of any appreciable numbers of Staphylococcus citreus and the rapid disappearance of the lesion would seem to be associated in some way with the high R-colony count that was present in this patient.

Cornbleet and Montgomery[18] have reported that exfoliation of skin causes a decrease in the skin's capacity for self-sterilization. It was thought that it might be of interest to present the data on case 12, which was one of Ichthyosis. Although this was a case of hereditary chronic exfoliation of the skin, yet, according to the classification on the basis of the percentage relationship of S to R colonies, we would say that this particular skin exhibited a well-developed protective mechanism. This statement was substantiated clinically, and does not agree with the statement of the above-mentioned observers.

The summary of the differences in the percentage of R to S colonies in normal and pathological cases is presented in tables 4 and 5. From these averages it can be seen that there was a distinct difference between the percentage of R colonies from normal and abnormal skin surfaces. That this percentage was high in normals and low or absent in abnormals certainly suggests that this mutating influence is a protective mechanism. This is further emphasized by the fact that in those subjects whose skin might be normal at the time of culture, but in whom there were predisposing tendencies toward pathology, the R-colony count was lower than normal.

That the normal skin flora should be Staphylococcus epidermidis-albus is generally accepted. The association of Staphylococcus aureus with pathological skin conditions was definitely shown by Michael[19] and later by Smith[20]. The most comprehensive work along this line was done by Smith who studied in detail the bacterial flora from varied skin conditions, on all parts of the body, in one hundred cases. In general, our work agrees with these observations, but we have found that Staphylococcus citreus also plays a part in skin pathology and should certainly not be considered a part of the normal flora. On the basis that Staphylococci aureus and citreus are not normal inhabitants of the skin and are associated with pathology, and inasmuch as in the presence of Staphylococci aureus and citreus the R-colony count is markedly reduced or absent, it must be considered that the factor influencing the S-to-R mutation in the skin flora is a protective mechanism playing a part in maintaing the normal staphylococcic balance and ridding the skin of abnormal inhabitants. This being true, the percentage of R colonies obtained on culture could be taken as an indicator of the degree of skin protection afforded in any selected individual. This would suggest a means of determining immunes and susceptibles in skin conditions around the eye, and if a satisfactory means of building up skin immunity were at hand, a new field of preventive medicine could be instigated. At the present time we are following this line of thought, but have at present too few cases to report in regard to influencing the protective mechanism of the skin. The results have, however, been encouraging. In closing, an excerpt is given from Smith's publication in which he is dis-

cussing pathological skin conditions associated with Staphylococci and in which he states "It would seem that surface antisepsis is more rational than attempts at raising general resistance." This line of reasoning would be suggested by the preceding experimental results, but where Smith uses the word *antisepsis* we would substitute *disinfection* and although antisepsis to Smith meant chemicals and x-rays, disinfection to us would apply rather to some biological phenomenon, however it might be brought about.

Conclusions

1. The factor influencing S-to-R mutation is constantly present on the normal skin surface around the eye.
2. The potency of this factor is proportionate directly to the distance away from the lid borders.
3. This factor may be related to the acid reaction of the skin.
4. This factor is diminished or absent in pathological skin conditions around the eye but returns during convalescence.
5. The S-to-R mutation on the skin is a protective mechanism.
6. The percentage of S-to-R mutation may be taken as an indicator of the power of the skin to resist infection and to rid itself of exogenous organisms.
7. The resistance of the skin is directly proportional to the percentage of S-to-R mutation.
8. The low normal limit of skin resistance, on the basis of percentage of S-to-R mutation, might arbitrarily be given as 10 to 15 percent. Anything below 10 percent could be considered potentially a susceptible skin.
9. A low percentage of S-to-R mutation is associated with the presence of Staphylococcus aureus or citreus on the skin.
10. By classifying the skin surfaces of the eyelids according to the degree of resistance on the basis of S-to-R mutation, and by building up this resistance in susceptibles by biological methods, the common staphylococcic infections around the eye, particularly styes, which are common and troublesome, can be prevented.

710 South Lincoln Street.

Bibliography

[1] Gowen, G. Howard. Amer. Jour. Ophth., 1934, v. 17, p. 36.
[2] Hadley, P. Jour. Infect. Dis., 1927, v. 40, pp. 111-112.
[3] ———. Jour. Infect. Dis., 1927, v. 40, pp. 167-168.
[4] Pasteur, Louis. Compt. rend. Acad. d. Sci., 1881, v. 92, p. 429.
[5] DeKruif, P. Proc. Soc. Exp. Biol. and Med., 1921, v. 19, p. 34.
[6] Gotschlich, E. Ztschr. f. Hyg., 1900, v. 35, p. 195.
[7] Reddish, G. F. Jour. Infect. Dis., 1921, v. 29, p. 120.
[8] Steinhardt, Edna. Jour. Med. Res., 1904, v. 13, p. 409.
[9] Bordet, and Sleeswyk. Ann. de l'Inst. Pasteur, 1910, v. 24, p. 476.
[10] Cowan, Mary. Brit. Jour. Exp. Path., 1922, v. 3, p. 187.
[11] Hadley, P. Jour. Infec. Dis., 1927, v. 40, no. 1, p. 111.
[12] ———. Jour. Infect. Dis., 1927, v. 40, no. 1, p. 37.
[13] Johnson, and Arnold. Proc. Soc. Exp. Biol. and Med., 1932, v. 29, pp. 501-503.
[14] Arnold, Gustafson, et al. Amer. Jour. Hyg., 1930, v. 11, no. 2, p. 350.
[15] Arnold, and Singer. Proc. Soc. Exp. Biol. and Med., 1930, v. 27, p. 364.
[16] Fleming, A. Proc. Roy. Soc. Lond., 1922, v. 93, p. 306.
[17] ——— and Allison, V. D. Brit. Jour. Exp. Path., 1922, v. 3, p. 252.
[18] Cornbleet, and Montgomery. Arch. Derm. and Syph., 1931, v. 23, pp. 908-919.
[19] Michael. Derm. Ztschr., 1923, v. 39, p. 329.
[20] Smith, J. F. Brit. Jour. Derm., 1928, v. 40, pp. 483-493.

A TANGENT SCREEN WITH ARTIFICIAL DAYLIGHT ILLUMINATION

CONRAD BERENS, M.D., DOROTHY KERN, AND BRITTAIN F. PAYNE, M.D.
NEW YORK

The screen described is an improvement on one presented before the American Ophthalmological Society in 1923. Certain features make it adaptable to accurate scientific examinations but it is most practical for clinical studies of the central area of the visual field. The working distance, which is 75 cm., is practical not only for mapping central visual fields and for studying angioscotomas and blind spots, but also for mapping diplopia fields and fields of monocular fixation.

Charting is facilitated by barely visible brown markings. Examinations with colored test objects are rendered more accurate by the use of a neutral-gray cloth and the after-images are less disturbing than when a black cloth is employed.

By means of spherical test objects and several arrangements of standardized daylight illumination, the tests become comparable and more reliable, especially when colored test objects are used. Read before the American Academy of Ophthalmology and Otolaryngology in Boston, September 22, 1933. This study was aided by a grant from the Ophthalmological Foundation, Inc.

The principal methods of studying visual fields are (1) by means of a perimeter, and (2) by means of a tangent screen. The perimeter is better adapted to measuring the peripheral visual fields, while the tangent screen is preferable for examining accurately the central area of the field. Many tangent screens have been devised since the first one by von Graefe[1]. Long experience with a screen previously described[2] has demonstrated that certain changes in the screen here presented* add to its practicability.

Description of the Screen

This tangent screen is a modification of the Bjerrum screen. A wooden frame, 6 feet square, is covered with felt one-half inch thick, and over this is stretched a dark neutral-gray cloth, preferably serge. The felt which covers the frame facilitates the use of pins in mapping scotomas, and the neutral-gray cloth makes tests with white objects more delicate. Ferree and Rand[3] have shown that the use of colored test objects against a gray background refines the tests. Quoting from their monograph: "The brightness of the surface to which the eye is pre-exposed may change the apparent limits (of the visual field) in certain meridians as much as 17 to 20 degrees. A pre-exposure lighter than the color gives a dark, and one darker than the color a light, after-image. These after-images change profoundly the saturation of the color sensation, also its hue. A background or surrounding field, lighter or darker than the color, produces a similar effect on the limits, but not so great."

All permanent markings on the anterior surface of the screen are made in brown*, so that the lines, which are almost invisible, do not interfere with the use of colored test objects. The markings may be stitched in with dark

* Made by E. B. Meyrowitz and Company, New York, N.Y.

* Pencil used is an L. & C. Hardtmuth, No. 95.

Table 1

Tan.	5°	equals	6.5625	cm.	Tan.	4°	equals	5.24475	cm.
Tan.	10°	equals	13.2225	cm.	Tan.	8°	equals	10.54050	cm.
Tan.	15°	equals	20.0925	cm.	Tan.	12°	equals	15.94200	cm.
Tan.	20°	equals	27.2977	cm.	Tan.	16°	equals	21.50625	cm.
Tan.	25°	equals	34.9725	cm.	Tan.	24°	equals	33.39225	cm.
Tan.	30°	equals	43.2975	cm.	Tan.	28°	equals	39.87825	cm.
Tan.	35°	equals	52.5150	cm.	Tan.	32°	equals	46.86525	cm.
Tan.	40°	equals	62.9325	cm.	Tan.	36°	equals	54.49050	cm.
Tan.	45°	equals	75.0000	cm.	Tan.	44°	equals	72.42675	cm.
Tan.	50°	equals	89.3850	cm.	Tan.	48°	equals	83.29500	cm.
Tan.	55°	equals	107.1075	cm.					

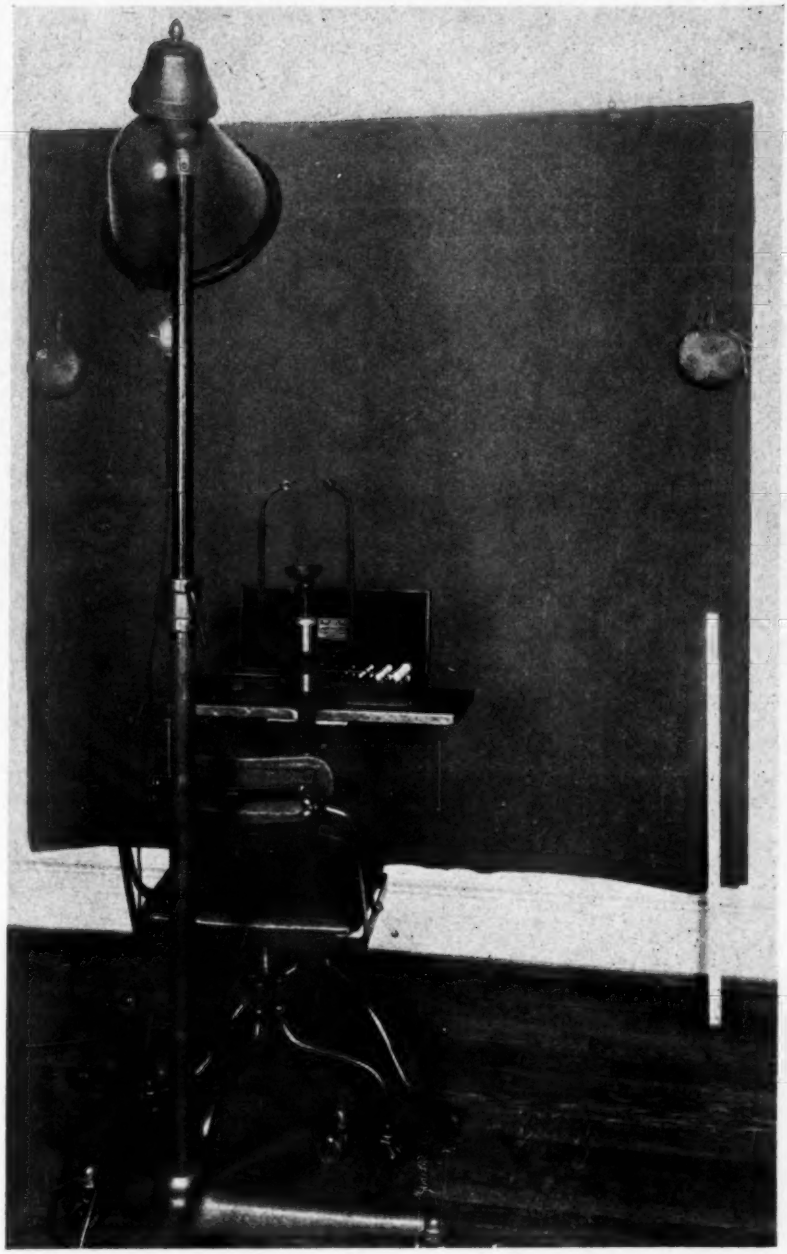


Fig. 1 (Berens, Kern, and Payne). Screen with working equipment and illumination as indicated in arrangement no. 1.

gray or brown thread instead of being drawn with a pencil.

For examining the central visual field, mapping diplopia fields and fields of monocular fixation the screen is used at a distance of 75 cm. This distance was found practical by Duane[4]. Evans[5], who also prefers a working distance of 75 cm., has devised a chart for direct recording of the findings. At 75 cm. the tangents are as shown in Table 1.

In the use of the above figures, in

drawing the 5-degree circle, a line is drawn on the screen 6.5 cm. from the point of fixation. The diameter of the circle is approximately 13 cm.

The point of fixation is marked 6 cm. above the geometric center, because the lower field of vision is more extensive than the upper. From the point of fixation on the screen, circles are drawn every 5 degrees, and vertical and horizontal lines every 4 degrees. The horizontal and vertical markings make possible a rapid determination of the approximate size of scotomas, for, as Cowan[6] has shown, 4 degrees on a tangent screen correspond to 1.02 mm. on the retina, and therefore, each degree corresponds to about 0.255 mm. on the retina. *Approximately,* one degree on the tangent screen equals 0.25 mm. on the retina, and 4 degrees equal 1 mm. (A tangent screen marked in *mathematically accurate* 4-degree squares has been constructed by Hardy[7].) Radiating lines diverging from the point of fixation are drawn every 15 degrees. For precise work, the markings should be made after the cloth has been stretched on the frame. For clinical purposes, the cloth may be marked and then fastened to the frame or a piece of heavy cloth may be marked and hung without stretching. It may also be attached to a roller.

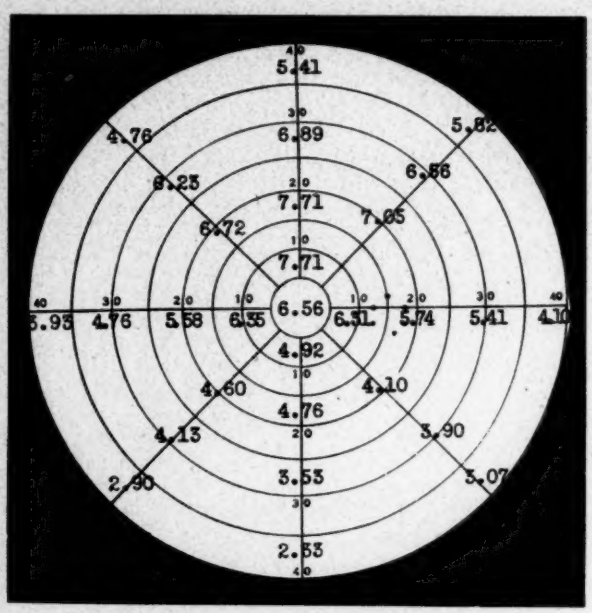


Fig. 2 (Berens, Kern, and Payne). Distribution of illumination in foot-candles with one lamp—arrangement No. 1.

Illumination

Illumination is of utmost importance. The Committee on Perimetry of the Thirteenth International Congress of Ophthalmology, in 1929, advised artificial-daylight illumination of 7 foot-candles intensity, which should be distributed as evenly as possible over the surface of the screen. Because blue bulbs and a wide variety of equipment are commercially designated as "daylight lamps," care should be exercised in securing lamps, the light from which will actually be similar to daylight. In our tests special daylight lamps* are used with the standard, readily available, clear Mazda bulbs in porcelain enameled reflectors fitted with selected Corning Daylite Filters. This equipment is of the type developed for artists and colorists requiring an exact visual reproduction of daylight-color quality of known color temperature and the desired diffusive characteristics.

This illumination should be so standardized that tests of the same patient at different times may be compared. The following arrangements may be used:

1. One Macbeth Daylight Lamp (JS57, recently redesignated JS59) with a 300-watt bulb placed at 1 meter from the screen, above and behind the patient's head. Figure 2 illustrates the distribution of illumination in foot-candles as determined with the Macbeth illuminometer, using the standardized test plate.

2. Two Macbeth Daylight Lamps (JLS17) with a specially frosted 150-watt bulb in each, placed at 1 meter from the screen to the right and left of the patient, 50 cm. from each side

* Lamps made by Macbeth Daylighting Company, Inc., New York, N.Y.

of the point of fixation. This arrangement distributes the illumination more evenly, but it may produce annoying reflections from the correcting lenses. Figure 3 illustrates the distribution of illumination in foot-candles as measured by Hardy[7].

3. One Macbeth Daylight Lamp (JLS17), with a 150-watt bulb, placed at 1 meter from the screen above and behind the patient's head. This furnishes at the point of fixation an intensity of light of 4.3 foot-candles and a variation in intensity of not more than 10 percent within the 25-degree zone. This illumination[2] makes possible a more delicate test than do the two preceding arrangements of the lamps.

Charts

Printed charts correspond exactly to the screen. Normal blind spots for this working distance have been outlined. Transferring the findings to the chart is a simple procedure because of the brown markings on the front of the screen and on the chart.

Uses of the Screen

Central visual fields. The visual acuity of each eye is recorded, both with and without correction, and the color vision is tested with the Ishihara plates. The patient is then seated in the darkened examining room for five minutes before the beginning of the test. For the examination he should wear lenses which correct his distance vision as accurately as possible. The screen is hung about one foot from the floor. The patient is seated on an adjustable-posture chair* before a narrow† perimeter table to which a headrest‡ is attached. The headrest prevents shifting of position and should be adjusted so that the patient's eyes are on a level with the center of the screen. A ruler may be used to check the working distance for each patient. Gray gloves may be worn by the examiner. A gray pinhead about 3 mm. in size is used for fixation; larger pins may be used for patients with reduced visual acuity.

Paracentral color vision is studied at 75 cm. with a 3-mm. spherical test object. It is most important to determine whether there is a central scotoma, absolute or relative, for the different colors. In order that the patient may determine whether there is a change in the shade of the test object as it is carried from the center toward the periphery, the fixation point should be of the same shade of gray as the screen itself. Single or binocular fixation may be used, but routinely one eye is examined, the other eye covered with an eye-patch. If there is a central scotoma and it seems desirable to employ binocular fixation, a red monochromatic glass on a handle is placed over the eye not under examination. Blue and green test objects are used. The patient's eye is readily observed during the test to note whether the fixation is steady. Any

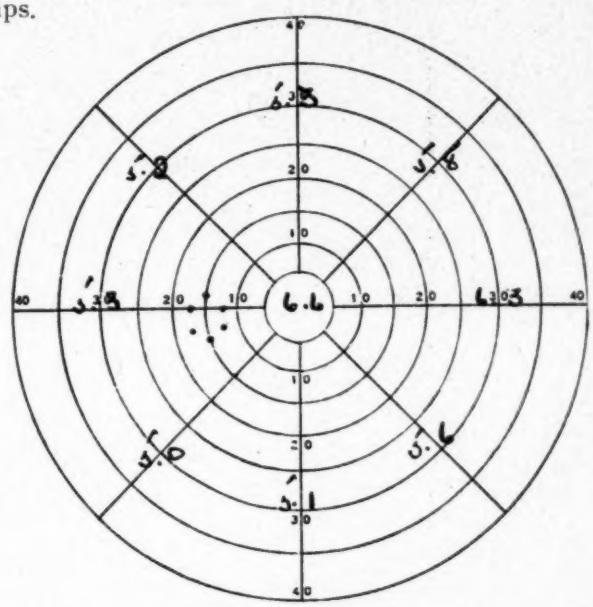


Fig. 3 (Berens, Kern, and Payne). Distribution of illumination in foot-candles with two lamps—arrangement No. 2.

* Chair manufactured by Fritz Cross Company, St. Paul, Minn.

† By cutting the top of the perimeter table in half, a full view of the screen is possible.

‡ Headrest made by Bausch & Lomb Optical Company, Rochester, N.Y.

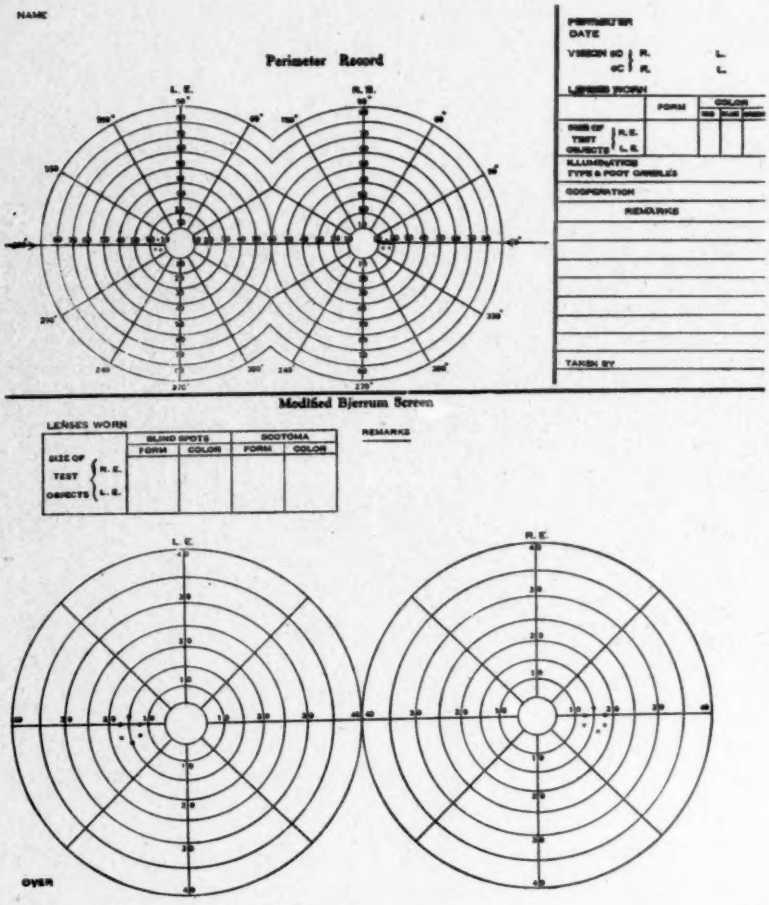


Fig. 4 (Berens, Kern, and Payne). Front view of recording chart. permitting comparison of the peripheral fields with enlarged central field, upon which scotomas are plotted.

type of test object may be used with this screen, but we recommend special white and colored spherical test objects[8, 9]. The test object should be moved slowly, the rate of speed to be determined by experience. The limits of the field may be determined by motion from the invisible to the visible area, by motion from the visible to the invisible area, or by an average of the two readings. In routine examinations we work from the invisible to the visible zone, and we have learned that if the test object is moved slowly enough, the limit found is generally almost the same as that of the average of both methods. The examination from the invisible to the visible area consumes less time and is therefore less fatiguing—a practical factor in clinical work. The method used should be stated on the chart.

It is also practical to map angioscotomas[10] at 75 cm. by using a 2-mm. white spherical test object or a 10-mm. blue or red spherical test object.

For the sake of convenience two pincushions are attached to the screen, one on each side. Pinheads of different colors may be made of sealing wax so that the central fields, blind spots, and scotomas may be plotted for each eye. Gray pins may be used for the right visual field, dark blue pins for the right blind spot, black pins for the left visual field, dark green pins for the left blind spot, etc., so that both eyes may be examined before the record is transferred to the chart. Each examiner should establish his own normal standards for

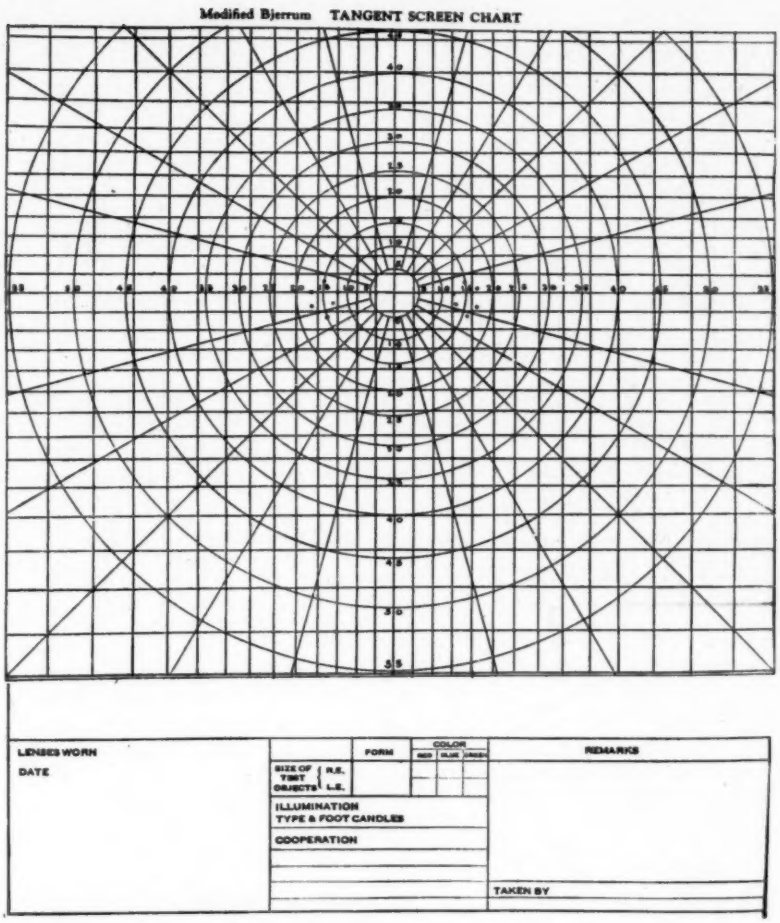


Fig. 5 (Berens, Kern, and Payne). Reverse side of chart shown in figure 4 for plotting diplopia fields and fields of monocular fixation.

the conditions under which he works. The tangent screen is accurate for studying the fields out to 30 degrees.

The limits of the visual field, as determined from a study of 50 patients whose eyes were apparently normal, are shown in figure 6. The average measurement of the normal blind spot in 50 normal eyes, as mapped with a 2-mm. dull white spherical test object, motion from the invisible to the visible zone, is 78 mm. in the horizontal plane and 110 mm. in the vertical plane. The measurement of the distance between the nasal border of the blind spot to the point of fixation is of importance particularly in patients suspected of having progressive myopia. Normally this is about 168 mm. The blind spot should also be studied with colored test objects[11], especially to determine scotomatous extensions in cases of glaucoma. Central fields for colors also may be mapped on the screen, using the special spherical colored test objects recommended.

Diplopia fields. For plotting diplopia fields we prefer a distance of 75 cm., therefore a large screen was made, permitting its use out to 50 degrees. A small electric bulb is used as the test object. The patient covers one eye (routinely, the right eye) with a red glass. White pins are used for the position of the white light, and red pins for the position of the light as seen through the red glass. Thus it is possible to plot the position of the eyes in relation to each other in the cardinal directions of gaze. Because of the use

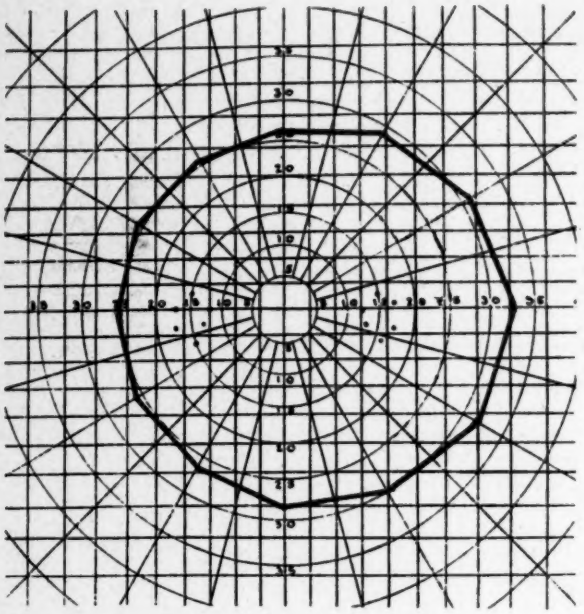


Fig. 6 (Berens, Kern, and Payne). Average normal limits of the visual field as determined from a study of 50 patients with apparently normal eyes. The test conditions were as follows: 1. Distance from the cornea to the point of fixation, 75 cm. 2. Illumination by one lamp with approximately 7 foot-candles intensity as described (fig. 2). 3. One millimeter spherical dull white test object. 4. Motion of test object from without-in (invisible to visible area), following the direction of meridional markings from the periphery of the screen toward the point of fixation.

of pins of different colors and the visible marking on the surface of the screen the findings are easily transferred to the chart.

Fields of monocular fixation. Fields of monocular fixation may be plotted also at a distance of 75 cm. The head is held securely by means of the headrest. Usually an eight-point field (the four corners of gaze and the four intermediate points) is sufficient. Moving the test object (three 2-mm. black dots on a white card) from the center toward the periphery, the patient is asked to turn his eye as far as possible in the direction to be examined and to signify the moment at which it is no longer possible to differentiate clearly the black dots. The pins, of a different color for each eye, should be placed at the points where the dots are no longer seen clearly. Both eyes may be plotted before the record is transferred to the chart. The approximate limits of a normal field of monocular fixation at a distance of 75 cm. are as follows: downward 50°; upward 40°; inward 45° to 50°; outward 50°.

Conclusions

We believe that the tangent screen described has certain features which make it not only practical for clinical purposes but also adapted to accurate scientific examinations. The neutral-gray background produces less retinal fatigue and with it the after-images are less disturbing. The brown markings on the neutral gray cloth are almost invisible and thus facilitate charting and the approximate estimation of the size of scotomas. The working distance of 75 cm. is practical for mapping central visual fields,

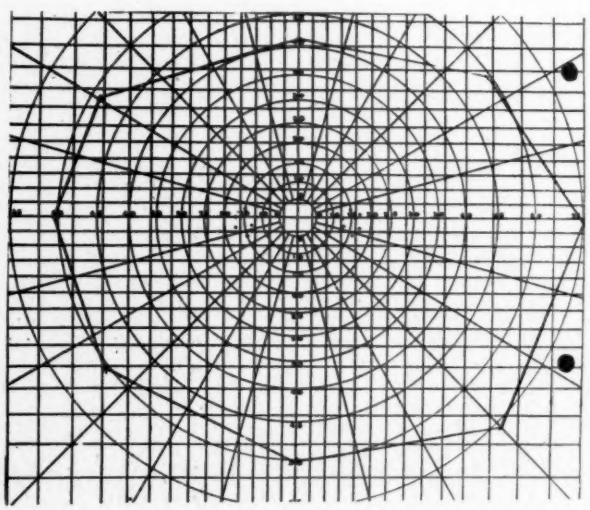


Fig. 7 (Berens, Kern, and Payne). Field of monocular fixation (right eye).

blind spots, scotomas and angioscotomas, diplopia fields, and fields of monocular fixation. The standardized daylight illumination makes possible the comparison of tests done on different days and increases the accuracy of the results of using colored test objects. The spherical test objects add to the accuracy of studies made on the tangent screen because the visual angle subtended is not affected by rotation of the test object, which may occur with the use of flat test objects, nor is the form distorted by foreshortening when seen obliquely.

35 East Seventieth Street.

References

[1] Peter, L. C. The principles and practice of perimetry. Philadelphia, Lea and Febiger, 1923, p. 53.
[2] Berens, C. Examination of the blind spot of Mariotte. Trans. Amer. Ophth. Soc., 1923, v. 21, p. 271.
[3] Ferree, C. E., and Rand, G. The campimeter—An illuminated perimeter with campimeter features. Trans. Amer. Ophth. Soc., 1920, v. 18, p. 164.
[4] Duane, A. A tangent-plane for accurately mapping scotomata and the fields of fixation and single vision and for indicating the precise position of double images in paralysis. Trans. Amer. Ophth. Soc., 1906, v. 11, pt. 1, p. 67.
[5] Evans, J. N. The campimeter recording and plotting chart. Amer. Jour. Ophth., 1924, v. 7, p. 691.
[6] Cowan, A. A suggestion for a new perimetric chart. Amer. Jour. Ophth., 1920, January, v. 3, p. 49.
[7] Hardy, L. H. Scotometry. Trans. Amer. Ophth. Soc., 1931, v. 29, p. 486.
[8] Berens, C., Evans, J. N., and Kern, D. White and colored spherical test objects for use in campimetry and perimetry. Trans. Sect. Ophth., Amer. Med. Assoc., 1931, p. 407.
[9] Berens, C., and Kern, D. A hand campimeter. Trans. Sect. Ophth., Amer. Med. Assoc., 1932, p. 349.
[10] Evans, J. N. The clinical value of angioscotometry. Amer. Jour. Ophth., 1931, August, v. 14, p. 772.
[11] Ferree, C. E., Rand, G., and Sloan, L. L. Sensitive methods for the detection of Bjerrum and other scotomas. Arch. of Ophth., 1931, February, v. 5, p. 224.

THE POSSIBILITIES OF ORTHOPTIC TRAINING

Further report

GEORGE P. GUIBOR, M.D.
CHICAGO

Two series of cases of nonparalytic squint are reported, which have been under observation for over one year. The control group (Series I) had no orthoptic training. The ordinary measures, such as the correction of refractive error, occlusion, and atropinization of the fixing eye were carried out. Series II was the treated group. The results after 6 months' observation or less may be summarized as follows: In the control group the squint was corrected in 12.5 percent of cases, while in the treated series this occurred in 50 percent. If the observation was continued longer than six months in the control group, 25 percent showed no squint, while in the treated group 60 percent showed less than 5 degrees of squint with glasses. The differences in the results secured in patients with 15 degrees of squint or less and in those with over 15 degrees are recorded: in 84 percent of the cases with 15 degrees or less there was no squint after training, while in only 37.1 percent was there recovery from squint in those with a marked angle anomaly. The technic is described. It is concluded that some type of orthoptic training should be attempted, even in cases of marked squint. The angle of anomaly may be diminished so that a less radical operation need be instituted. From the Department of Ophthalmology, Northwestern University Medical School. This study was done with the aid of a fellowship supplied by the Knapp testimonial fund and a grant from the American Academy of Ophthalmology and Otolaryngology. Read before the American Academy of Ophthalmology and Otolaryngology, in Boston, Sept. 17, 1933.

A preliminary report of the possibilities of orthoptic training was presented at the Ophthalmic Section of the American Medical Association in June, 1933. This report covers those patients included in the previous report and additional cases which have been accepted for treatment and observed for at least six months.

Several articles on this subject have appeared since the previous report. Most important of these is a statistical report by Herzau[1] on the treatment of amblyopia in 41 cases in which 43 percent of improvement had been secured by constant monocular occlusion of one to six months' duration. In only 5 percent of these cases was stereoscopic depth perception present. In addition, others had binocular fusion and some faulty depth perception. This work is discussed by Bielschowsky[2], who finds that best results are secured if the occlusion is undertaken before the age of six years. Bielschowsky asserts that the squint angle must be small or must be reduced by surgical means so that the impulse to fuse becomes operative or else the relief of squint cannot be obtained by orthoptic measures alone. Peter[3] similarly gives a detailed description of the management of squint and the improvement of vision in the amblyopic eye. He secures improvement of vision improved beyond two lines in the cases below seven years of age.

In our treatment of amblyopia, we have been unable to occlude one eye permanently over long periods of time, due to poor cooperation. In only 25 percent of our cases, therefore, was the vision improved beyond two lines in the Snellen Chart.

Series II designates cases which appeared at the Northwestern University Orthoptic Clinic and Series I those which appeared at the Control Clinic at Children's Memorial Hospital. It will be recalled that at the Control Clinic no orthoptic training has been carried out. The ordinary measures exclusive of fusion training, such as the correction of the refractive error, occlusion, and atropinization of the fixing eye, have been carried out since September 1, 1932.

The results secured and given in the previous report may be summarized as follows (see chart 1): In the control group of 40 cases the squint was corrected in 7.5 percent when glasses were removed and in 12.5 percent with glasses, while the angle of anomaly was improved in an additional 25 percent. In the group of 38 cases which had the advantages of orthoptic train-

ing, the squint was absent in 42.1 percent without glasses and in 50 percent with glasses, while the squint angle was improved in an additional 34.2 percent. The average results of observers employing orthoptic treatment whose records are sufficient for this purpose show a recovery with glasses in 46.75 percent and improvements in 37.5 percent. Some of the reports of others included results secured by operation plus orthoptic training, whereas our series do not include cases on which operations were performed.

pseudo-binocularism, which is a slow alternation of the eyes and which simulates binocular macular perception.

In Series II (see chart 2) 16 additional patients have been given orthoptic training for six months or longer, giving a total of 54 cases in the treated series. Twenty other cases have not been included because of irregular attendance, or because they have been under observation less than six months. *All patients included had worn proper correction for six months or longer before orthoptic training was instituted.*

Chart 1

RESULTS—PRELIMINARY REPORT

Series I (Controls) and Series II (Treated) Compared with those of Other Observers

	Squint Absent With Glasses	Squint Absent With Glasses Removed	Squint Improved	Squint Unimproved
	percent	percent	percent	percent
Series I Controls (40 cases)	12.5	7.5	25	62.5
Series II Treated (38 cases)	50	42.1	34.2	15.8
Results of other observers, using orthoptic training	46.75	No record	37.5	15.75

Note—Training period six months or less.

In the Control Clinic, 13 new patients were admitted who appeared regularly for observation. Ten additional patients are attempting home training with the stereoscope and are not included in this report. A total of 53 patients in the Control Clinic have, therefore, been under observation for six months or longer. Of these, 24.7 percent were below 5 years of age; 64 percent were below 7 years.

Results in this control group (see chart 2) since the last report have been as follows: In 9 percent there was no squint without glasses and in an additional 25 percent there was five degrees or less with glasses; 24 percent showed an improvement of over 10 degrees, and in 41 percent there was no improvement. Nine percent showed constant depth perception in the stereoscope, with no fusion amplitude. Only 7.5 percent showed constant binocular vision with some fusion, and in 83 percent monocular vision persisted as

The results secured in Series II since the last report are as follows: In 60 percent of these cases the squint was corrected if glasses were worn, in 57 percent the angle of anomaly was 5 degrees or less with glasses removed. An additional 10 percent showed improvement in the angle of anomaly of 10 degrees or more. In 30 percent, no improvement was noted. Of the whole series, 50 percent could fuse accurately with the stereoscope, amblyoscope, and synoptophore with constant depth perception. An additional 40 percent had varying degrees of binocular perception with absent or poor stereoscopic ability. One percent had monocular vision.

If one examines this second chart in detail and compares the unimproved cases with those of chart 1, he will note that there is an increase in the percentages of unimproved cases in Series II from 15.8 percent to 30 percent. This is because of the number of patients with squint over 25 degrees who have been

admitted during the past six months. There were admitted also, two additional patients with alternating squint. Approximately 10 percent of the patients reported as improved in the previous record now show no further improvement; hence, are included in this unimproved percentage. In chart 3 are data on 35 patients with squint ranging from 20 degrees to 45 degrees. Of these only 37 percent had no squint after orthoptic training. It should be noted, that 13, or 30.4 percent, are unimproved in this group.

Chart 2

RESULTS—SUBSEQUENT REPORT

Series I and II

	Squint Absent With Glasses	Squint Absent With Glasses Removed	Squint Improved	Squint Unimproved
	percent	percent	percent	percent
Series I Controls (53 cases)	25	9	24	41
Series II Treated (54 cases)	60.1	57.4	9.9	30

Note—Training period six months or more.

One must not obtain the idea from this report that patients with a marked angle of anomaly can be relieved as easily as those with a small degree. Chart 3 shows results in patients with a squint of 15 degrees and those with squint of more than 15 degrees. There are 19 cases in which at the beginning there was 15 degrees of squint or less, and in 16 of those, there was no squint after six months or more of orthoptic training (84.1 percent). In this group, there were only three which remain unimproved.

Chart 3

RESULTS SECURED BY ORTHOPTIC TRAINING IN HIGH AND LOW DEGREES OF SQUINT

Degree of Squint	No. of Cases	Percentage Corrected
15 or less	19	84.1
Over 15	35	37.1

Orthoptic-Training Technic

It may be well to review briefly the methods of training in the Northwestern University Clinic. Treatment was given these patients for one hour each week. In some cases it extended to two hours. Few had stereoscopes for home use. Atropine was used extensively in the fixing eye, and while under the influence of atropine, alternation of the squint developed. In these cases the continued use of orthoptic exercises usually resulted in stereoscopic vision with fusion. This was accomplished by exercises with the stereoscope, using loose hand prisms, bases out, for convergent squint. Gradually, the strength of these prisms was lessened until fusion was obtained without such prisms. Fusion amplitude and duction power were developed further by moving the stereoscope arm toward and away from the eyes. Then prisms, bases in, for convergent squint, were used in increasing strength to develop duction power and fusion amplitude.

A definite check system was inaugurated to train and improve fusion ability. This consisted of (1) observing the eyes through the front of the stereoscope to prevent an alternation (pseudobinocularism) of vision; (2) the pointing test, by which the card is described, and the fixing eye determined; (3) check cards, the "C" series of Wells charts; (4) the use of split charts showing them to the patient three times and alternating them from side to side.

These check methods are of especial

aid in determining the fixing eye, suppression, suspension, monocular vision of alternating type, and stereoscopic fusion with fusion amplitude.

Stereoscopic Depth Perception

It was thought advisable to secure additional data concerning stereoscopic depth perception of patients who were able to fuse test charts in the stereoscope. For this purpose the Howard apparatus[4, 5] and Verhoeff's test[6] for stereoscopic ability were used. Fifteen patients were given ten trials with the Howard apparatus. All patients who had accurate stereoscopic vision in the stereoscope could, likewise, demonstrate accurate depth perception by exposing the upright pegs one-half second or less in the Howard apparatus. Patients who required a longer period of time to fuse in the stereoscope, say ten seconds, required a similar length of time in this Howard instrument. After this length of time their judgment was correct, but they were unable to pass a satisfactory test when the time of exposure was shorter.

Definite types of stereoscopic ability can thus be recognized by using the Howard apparatus. These are similar to the types described by Howard. For brevity we may classify them as:

1. Patients with accurate judgment of depth differences of 1½ centimeters on instantaneous exposure.
2. Those able to distinguish depth differences of 6 to 25 centimeters after 10 to 15 seconds.
3. Those able to distinguish depth differences of 15 to 50 centimeters after 10 to 15 seconds.
4. Those unable to give correct judgment of any depth with this apparatus.

In using Verhoeff's test, we have been unsuccessful in obtaining accurate data with small children who do not understand what is expected of them. Visual acuity, too, has an especial influence in this test. It may be said, therefore, to be a very delicate test for the determination of stereoscopic fusion, but not practical in certain cases of visual defect. Many patients probably have serviceable depth perception who could not pass the requirements of Dr. Verhoeff's new stereoscopic charts. The efficiency of the charts cannot be gauged accurately until a larger number of patients has been examined.

Alternating Squint

Just what can be accomplished in alternating squint is an open question at the present time. On one side, Worth, Peter, and others believe that little can be accomplished in this type of strabismus by orthoptic measures alone and that stereoscopic depth perception can seldom, if ever, be produced. On the other hand, Hansell and Reber[7] and Dobson[8] believe that many such patients can be "cured" by orthoptic training. Dobson, especially, believes that the Dobson-Hearne spectacle frame is very useful. This author emphasizes the extreme weakness of the abductors, which prevents recovery, rather than an absent fusion ability. Our findings have been similar to Dobson's, in that we have had patients with alternating squint who could fuse stereoscopically. The extreme weakness of abductors, especially in simultaneous abduction, is a bar to recovery, rather than the lack of ability to fuse in the stereoscope.

There have been cases of alternating squint in our series. Four patients have become able to fuse stereoscopically and three have been unable to do so persistently. These three have persisted with monocular vision of alternating type (pseudobinocularism). Of the four patients who developed fusion, there was one in whom the angle of anomaly was 25 degrees and squint was corrected with the constant use of glasses and orthoptic training. Twenty-five degrees of squint are still present if glasses are removed. One patient with 10 degrees has no squint present with or without glasses after training. Two who developed fusion have shown no improvement in the angle of anomaly. The three cases without fusion have remained the same.

Pseudostereoscopic or Inverted Stereoscopic Sense

The latest study[9] of depth perception seems to have overlooked the interest-

ing phenomenon that pseudostereoscopic vision[10] is often present at some time during orthoptic training. It is an accurate association and fusion of the retinal images, except that the impression of relief in fused images is inverted. It persists for a short time and may appear during the treatment. It is not a hindrance to development and gradually disappears under training, being replaced by correct depth perception. There have been eight patients showing this phenomenon early in their orthoptic training. Two have learned to fuse with an apparently normal correspondence.

Additions to the technic previously used at Northwestern are being made. The preparation of a series of charts is being undertaken. These are to be graded in difficulty of fusion and will be used to check binocular fixation, to overcome suppression, for the development of stereoscopic fusion, and for improving fusion amplitude.

The squint occluder mentioned in older literature and later described by Dobson is to be tried, especially in alternating squint. This is a binocular occluder with holes made so that the squint angle will gradually be decreased by widening the pupillary diameters of the corrector. Additional technic for treating alternating squint is being formulated.

Varying the refractive correction before the fixing eye in order to lower visual acuity is being employed. Details as to its accuracy will be recorded in a later report.

The use of prisms in slipovers is being used extensively. Early in the training of convergent squint, prisms, base out, are prescribed for constant wear, as suggested by Sattler. The strength of these prisms is gradually reduced until the angle of squint becomes less and stereoscopic fusion occurs without prisms. Prisms of 2 degrees, base in, are now worn; first, a few hours, and then over gradually increasing lengths of time, thus increasing abduction power and fusion amplitude. These slipovers with prisms are extremely useful in divergent squint, especially for developing adduction power. Up to date they have been of no avail in alternating squint. With hyperphoria remaining after orthoptic training, the hyperphoria can be reduced from 2 to 8 prism diopters by constant wear, after which the remaining hyperphoria can be relieved by prisms ground into the glasses. These prisms are 40 millimeters round and inserted in metal frames which are adjusted so that the lenses may be rotated.

Summary and Conclusions

Additional data concerning a control group of squint cases (Series I) and a treated group (Series II) are presented:

1. In Series I, 25 percent had no squint with glasses on, 9 percent had no squint if glasses were removed, 24 percent showed an improvement of 10 degrees or more in the angle of anomaly, 41 percent showed no improvement.

2. In Series II, 60 percent had no squint with glasses on; of these, 57 percent if glasses were removed; 9.9 percent showed an improvement of 10 degrees or more; 30 percent were unimproved.

3. During the first six months of treatment maximum results can be secured in orthoptic training and by other means.

4. If training is continued longer than six months, an additional recovery will occur in 10 percent of cases.

5. Fusion in the stereoscope can be checked accurately with the Howard apparatus if tests are made for similar lengths of time in each instrument.

6. Inverted stereoscopic fusion, or pseudostereoscopic fusion, does not prolong orthoptic training. This should be differentiated from pseudobinocularism which does prolong such training.

7. Although, as shown in the control series, a certain percentage of patients is corrected by the use of glasses, atropine, and monocular occlusion, orthoptic training, in addition, according to some such set plan as used in Northwestern University Clinic, will give a large additional percentage of correction (48 percent in our series). A further advantage secured by orthop-

tic training is the development of binocular fusion and depth perception; 50 percent as opposed to 7.5 percent in the control series. Besides the obvious advantages of the stereoscopic vision, it would seem to afford a certain measure of security against the recurrence of squint in these cases.

8. Although correction is secured less often in squint of more than 15 degrees, a period of training for such patients seems to be of value. In the first place, the angle of anomaly may be improved, so that a less radical operative procedure will be required, and, secondly, patients are prepared for the fusion training which should in most cases follow any operative treatment.

747 Fairbanks court.

Bibliography

[1] Herzau. Klin. Monatsbl. f. Augenh., 1933, v. 90, p. 612.
[2] Bielschowsky. Klin. Monatsbl. f. Augenh., 1933, v. 90, p. 551.
[3] Peter. Amer. Jour. Ophth., 1933, v. 16, p. 481.
[4] Howard. Amer. Jour. Ophth., 1919, v. 12, p. 656.
[5] Deyo. Amer. Jour. Ophth., 1922, v. 5, p. 343.
[6] Verhoeff. Amer. Jour. Ophth., 1933, v. 16, p. 589.
[7] Hansell, and Reber. Ocular muscles. Philadelphia, Blakiston's Son and Co., 1912, p. 171.
[8] Dobson. Squint. Oxford Press, p. 31.
[9] Pacalin, G. Arch. d'Opht., 1933, v. 40, p. 460.
[10] Schaefer. Physiology. New York, Macmillan Co., 1900, v. 2, p. 1134.

It is a pleasure to acknowledge with thanks the cooperation of Dr. Richard Gamble, attending ophthalmologist of the Children's Memorial Hospital, in making it possible to obtain material for the control series, and to thank Dr. Sanford R. Gifford, head of the Department of Ophthalmology, Northwestern University, for his advice and the supervision given in the orthoptic clinic and in the preparation of this paper.

STUDIES ON THE CRYSTALLINE LENS

The role of tetany in parathyroid cataract

EVERETTE I. EVANS
CHICAGO

Young dogs kept on a special bread-sour-milk-liver diet for a month after weaning were thyroparathyroidectomized. Tetany was not seen to occur in any of the young dogs so treated. Examination of the lenses of these animals indicated that there was a characteristic change in the lenses of the young, parathyroidectomized dog, very similar to that described by Goldmann. The chief difference between Goldmann's experiments and these is that Goldmann noted no lenticular change if tetany was not allowed to occur. In these dogs characteristic lens changes occurred although no tetany was seen. Emphasis is made on the possible role of toxins in the development of the parathyroid cataract. From the Department of Physiology, University of Chicago.

Introduction

In an earlier paper (Evans and Kern, 1931), comparison was made of the inorganic content of experimentally produced parathyroid-cataractous dog lenses and that of clinical senile human cataractous lenses. It was shown that the calcium content of the ash of "parathyroid-cataractous dog lens" is approximately 25 times that of normal dog lens. In the present communication, the author desires to report the occurrence and describe the lenticular degeneration leading to opacity in five young parathyroidectomized dogs in which tetany never occurred.

Literature

The earlier observations of Luckhardt and Blumenstock (1923) that animals which have survived complete parathyroidectomy eight months or more, show bilateral cataracts have been confirmed (Goldmann, 1929; Evans and Kern, 1931; Evans, 1933). Later Eiseman and Luckhardt (1927) demonstrated that, contrary to the opinion of some clinicians, convulsions (oil of wormwood and strychnine), *per se*, would not produce cataracts. Further, Eiseman and Luckhardt were able to show that no cataracts appeared in dogs treated in such a way that there existed a state of low blood calcium or high blood inorganic phosphorus.

Goldmann (1929) made an extensive study of parathyroid cataract in a group of 40 rats and 2 dogs. One dog (Bobby) was given sufficient calcium lactate so that no symptoms of parathyroid deficiency were observed. When the calcium lactate in the diet was diminished and tetany allowed, Goldmann noted changes in the lenses of this dog two days later. Further, he found that whenever tetany was allowed to occur, new lens changes followed shortly thereafter. In another dog (Fifi), the tetany was not controlled so closely, with the result that the dog suffered numerous attacks.

Goldmann concluded from his study on tetany cataract that "Ohne muskeltetanie Symptome keine Cataract." Further, the extent of the opacities appeared to be in direct relation to the number of attacks of tetany suffered by the parathyroidectomized animal. If the tetanic seizures were suppressed by administration of calcium lactate, so also were the lenticular changes suppressed. Hyperemia of the ciliary vessels enhanced the lens changes. From Goldmann's paper it appears that he did not believe that the convulsion of the tetany, *per se*, caused the lenticular opacities, but rather that they were the result of the general toxic disturbance, and toxins had diffused from the blood vessels into the aqueous humor and then attacked the lens fibers.

Because it is apparent that there still exists some question as to the actual role of the tetany in the etiology of clinical parathyroid (postoperative tetany) cataracts the author desires to stress the point that *in the experiments now being reported no tetany was ever observed* in the young dogs. O'Brien (1932) has reviewed the literature pertaining to this question and it need not be repeated here.

Experimental data

The dietary control of parathyroid tetany in young dogs by bread-and-sour-milk diet will be outlined elsewhere (Evans 1934[a]) so only a brief mention will be made of the experimental procedure.

Eight young dogs were placed on a diet of sour milk, bread, and liver immediately after they were weaned. This diet was continued for 30 days, when the dogs were completely thyroparathyroidectomized. Death from tetany occurring in only one dog, this diet was continued for 40 days after the operation and after this the living dogs were placed on the regular laboratory diet of bread and meat, plus 100 gm. of sour milk daily. After the 75th day of survival the sour milk was omitted.

At no time during the period of this dietary regime was tetany seen to occur in any of these 7 dogs. It is apparent that these animals had been completely parathyroidectomized because immediately after the operation the blood calcium dropped from the normal level of 10 mgm. percent to the usual tetany level of 5 to 6 mgm. percent. Further, the blood inorganic phosphorus rose to the tetany level of 10 mgm. percent. It was evident to the writer that here was afforded a means of controlling postoperative parathyroid tetany in young dogs. It was hoped that the customary lenticular changes following parathyroidectomy would not occur in these dogs, but such hopes were not realized. Five of the seven dogs showed lenticular changes as a result of parathyroid deficiency.

Almost daily examinations were made of the lenses of these animals, with the ophthalmoscope at a distance and with a magnifying glass and transmitted light. It was intended that slitlamp examinations should be made and the necessary steps had been taken to do this. Unfortunately, although the animals had survived the operation for 120 to 150 days, before the slitlamp examinations could be made all the dogs contracted a severe form of distemper and had to be killed. In this report, therefore, we are dealing with lenticular changes that began approximately one month after the operation and continued to develop for four months.

Six adult dogs were then given this same dietary treatment before and after thyroparathyroidectomy. Of this adult group only one survived long enough (57 days) for lenticular changes to become evident. This dog had but one attack of tetany.

The lenticular changes in these dogs are described in the discussion of the results obtained from this study. When any of the five young thyroparathyroidectomized dogs became so ill from distemper that recovery was deemed impossible, the animal was killed by the intravenous injection of 50 mgm. sodium cyanide. The eyes were excised within 2 or 3 minutes, the lenses removed, excapsulated, and glutathione determinations were made immediately on the sulphosalicylic extracts of these lenses. The data on glutathione are reported elsewhere (Evans 1934[b]). In every case, however, the glutathione content of these lenses was 50 to 70 percent lower than that found in normal dog lenses; that is to say, the glutathione content of these cataractous lenses was about 0.150 percent, while, by the methods used, the normal dog lens showed consistently a glutathione content of from 0.380 to 0.390 percent.

Lenticular changes

In our earlier study of the biochemical nature of postoperative-tetany cataract in the dog, a complete examination of the nature of the earlier degenerative process in the lens was not made. We were interested at that time in the gross pathology as indicated by the increase in calcium content of the lens. In the present study, however, the writer took particular care to begin ophthalmoscopic examinations of the lenses of the young parathyroidectomized dogs immediately after the operation. In the 5 young dogs in which lenticular degeneration was noted, these changes were so strikingly uniform that a description of the lenses of only one dog will suffice. In every case the same pathology was observed in a more or less advanced degree.

In one case, not considered hereto-

fore, an apparent total thyroparathyroidectomy was done in a young dog treated in the above manner. However, when examinations were made of the blood calcium and phosphorus after the operation, there was no change from the normal for a period of at least five months following the operation. This dog, then, may be considered to have had accessory parathyroids. In the five months after the operation, there was some evidence of thyroid insufficiency but, although careful ophthalmoscopic examinations were made of its lenses, no change from the normal was detected. This would indicate that the lenticular degeneration described in this paper is due to parathyroid insufficiency and is not related to any thyroid insufficiency that might have been caused by the total thyroidectomy.

Goldmann (loc. cit.), in his study of experimental-tetany cataract in two dogs, has given us a most excellent account of the lenticular changes that occur after parathyroid removal. The following description of the lenses of the author's dog, P.T.N.S. No. 2, resembles quite closely the description that Goldmann made for his dog "Fifi." Because the writer was unable to make slitlamp examinations, the description given here will of course be less complete than that of Goldmann.

Examinations made during the first three to four weeks after parathyroidectomy failed to reveal any lenticular changes detectable by the methods used. At about the fourth week, when particular care was taken with a magnifying glass and transmitted light, it was noted that in the region of the anterior suture the individual lens fibers (or at least groups of a few fibers) could be made out. As the fibers approached the periphery, they became indistinct in outline, and in some cases could only be seen at points very close to the anterior suture lines. If the focal point rested on the posterior suture, the same phenomenon was presented. The sutures themselves were more or less indefinite. In about a week, it was estimated that the lens fibers themselves had become considerably more swollen and could be traced now to the periphery. The first detectable opaque points ("Punkttrübungen") now appeared in small numbers and size in the subcapsular region, at the sutures, both anterior and posterior. It was not specifically noted that any "vacuoles" were present between the swollen lens fibers.

For purposes of comparison the description by Goldmann of the lenticular degeneration in his parathyroidectomized dog "Fifi" is given:

> He states that the whole layer of "Punkttrübungen" was "asbestglänzend" and was best examined with the magnifying glass and in transmitted light. When examinations were made in this manner, Goldmann found that in a careful examination he could make out the fiber diagram (which was not distinguishable in focalized light), which consisted of pure swollen fibers, whose course sprang from the anterior suture and continued to the posterior suture. These fibers lay in great tubes and only in the thin zone of vacuoles. The width of a single fiber was 1/24 mm. by direct measurement (normal width about 0.01 mm.) If more attacks of tetany occurred, the vacuole opacities grew in size. Four months later, the layer of the older opacities had changed, the vacuole strands becoming finer, but now the fibers in focal light were fine-grained, opaque lines. This opaque layer was separated by a clear, subcapsular interval, giving a typical picture of zonular cataract. In the region of the opaque zone, was situated the suture which formed a Y-shaped slit. In transmitted light the fibers shone; the fundus reflex was now of the lower grade.

So far as the writer can determine, the lenticular changes as noted by him are almost identical with those described by Goldmann. There is perhaps only one particular difference; that is, in the eighth and ninth weeks after the parathyroidectomy was performed in the dogs in the present series, it was specifically noted that there was a marked increase in opaque points at both anterior and posterior sutures. The only change now and later on was that the lens fibers became more opaque and there was a decided increase, week by week, in the number and size of the opaque points at the sutures. Figure 1 illustrates the appearance of the right lens of this dog, 150 days after the operation, as seen with a magnifying glass and transmitted light. It may be compared with the illustration given by Goldmann for his dog "Fifi," one year

later than the description above, when Goldmann's animal showed the picture of zonular cataracts (Abb. 37, page 183).

As in Goldmann's case, it is easily seen that the lens fibers spring from the suture lines which form a "Y" at the anterior surface. In the case described by the writer and pictured in figure 1, the number and density of opaque points at the anterior suture were more pronounced, so that there a region of almost total opacity existed. For those unfamiliar with the lens-fiber diagram, a schematic drawing is shown in figure 2 illustrating the formation of the Y sutures at the anterior and posterior poles, with the direction of the lens fibers indicated. From this schematic drawing it may easily be seen wherein lies the source of the opaque lines representing the opaque lens fibers shown in figure 1.

In the one adult dog which lived long

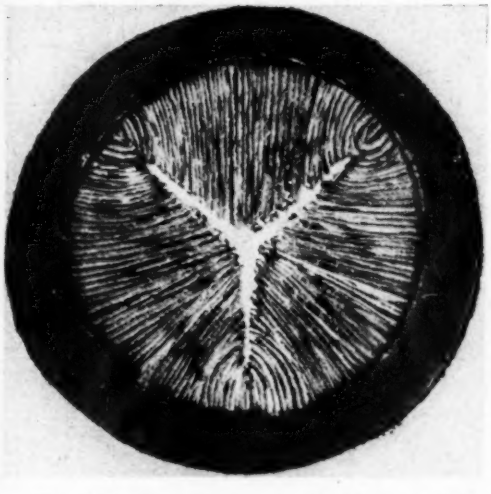


Fig. 1 (Evans). Appearance of lens of right eye of young, parathyroidectomized dog (P.T.N.S. No. 2), 150 days after operation, as seen with a magnifying glass and transmitted light.

enough for lenticular changes to be evident, the pathology of the lens was not so spectacular. In this dog, a female, about 4 or 5 years old, one attack of tetany was observed, when the animal went into oestrus. The only change noted was the appearance of the subcapsular vacuoles, spherical in outline, over the whole surface of the lens. This was true of both the anterior and posterior surfaces. These vacuole opacities appeared at about the third week after parathyroidectomy. The lenticular changes presented resemble somewhat those illustrated by Goldmann for his dog "Bobby," except that the vacu-

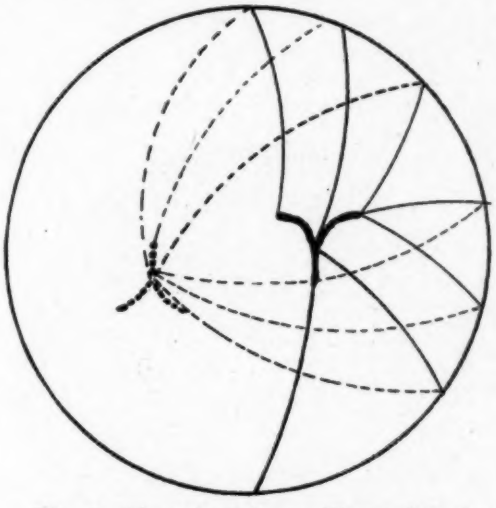


Fig. 2 (Evans). Schema illustrating the course of lens fibers from the anterior and posterior sutures (after Duke-Elder).

oles did not appear to be "comma shaped" but were more spherical in outline. It was never possible to make out the individual or grouped lens-fiber outlines in this animal. Up to the time of its death (57 days after the operation), the only detectable change in the lenses from the normal was the appearance of these opaque vacuoles, which tended to become more opaque in the seventh and eighth weeks after the operation. In figure 3 is illustrated the picture presented by this dog.

Discussion

At the outset of his work, Goldmann asked himself this question: How does cataract begin? What is its course of development, after parathyroid extirpation, from its beginning to its later form? and what is the relation of its development to the simple manifestations of tetany? It seems to the writer that there is given by Goldmann's and the author's researches at least a par-

tial answer to this question. It appears from both outlines of work that in the dog there is a distinct picture of the development and course of lenticular degeneration. The first manifestation seems to be a swelling of the lens fibers, especially in the young dog. Furthermore, the site of the first opaque points is in the region of the sutures. Before the writer had carefully read Goldmann's work, he was impressed with the fact that in the region of the sutures was to be found the greatest number of

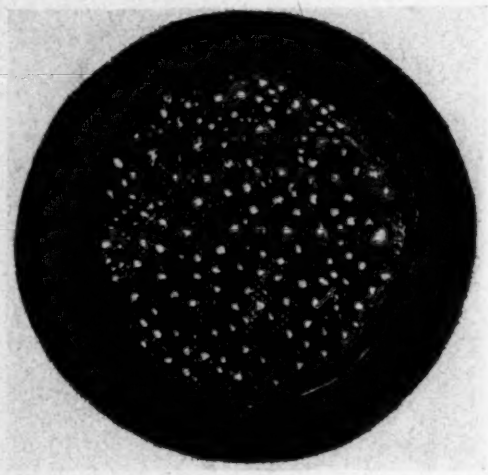


Fig. 3 (Evans). Appearance of right lens of adult dog (see text) as seen with the magnifying glass and transmitted light.

opaque points or, as Goldmann has expressed it, "The sutures are the site of predilection for opacities."

Just why the sutures should be the "site of predilection" for the appearance of the greatest number of opaque points is obscure. It seems probable, however, that they may be the regions of poorest nutrition, or they may be the points attacked by any hypothecated toxins. At least it is certain that in all of the five young parathyroidectomized dogs discussed in this paper, at the *suture* was to be found the greatest opacity.

Whether the development of "parathyroid cataract" in the human subject follows these general lines (swelling of individual lens fibers, opaque points first at the suture, etc.) seems not to have been determined (see O'Brien 1931). Goldmann made observations in one case and found that the process in the dog was not like that in human cataract. It is necessary that closer observation be made of the general course of the development of postoperative parathyroid cataract in the human subject, especially soon after the initial signs of parathyroid deficiency are noted.

The relation of tetany to cataract

It would seem that there is offered in this study evidence that tetany, *per se*, plays no role in the development of parathyroid cataract. The older writers on the cause of cataract were impressed with the tetanic convulsions accompanying the lenticular changes and offered various explanations for the role of tetany in these changes. The principal theory was that the opacities were due to the ciliary-muscle spasms during the general tetanic seizures. Later workers saw the problem in a more reasonable light and believed that the cause of tetany and of the opacity was the same. They could not see how ciliary-muscle spasm alone could cause the opacity.

So far as the author can determine, these experiments offer conclusive evidence that the tetany which usually occurs during a state of parathyroid deficiency plays no role in the development of the cataract. These young dogs of the writer suffered the customary parathyroid deficiency as measured by biochemical changes in the blood, never experienced an attack of tetany, yet showed the characteristic lenticular degeneration. It is therefore evident that parathyroid cataract is due to other causes, some unknown, obscure change (toxemia) that takes place during the state of clinical parathyroid deficiency.

There is one important point in which the experiments of the writer are not in agreement with those made by Goldmann. The latter found that when tetany was not allowed to occur in dog "Bobby" (tetany was controlled by Luckhardt's method, 1.5 gms. calcium lactate per kilo each day), no further changes in the lens took place. In another, in which an attack of tetany was allowed later, new opaque points ap-

peared. The results led Goldmann to conclude that a state of acute parathyroid deficiency and tetany must intervene if lens changes are to occur. In the writer's experiments no calcium lactate was ever given, but tetany was controlled by the use of a proper milk diet. Nevertheless, though no tetany ever occurred (so far as the writer is aware), a similar lenticular change was noted in these dogs. At this time, the writer is unable to explain the discrepancy between Goldmann's and his experiments; i.e., cataract with and without tetany. The state of parathyroid deficiency in these animals and the efficacy of the sour-milk-bread diet used in these experiments has been discussed elsewhere and need not be repeated here.

Considerable attention has been paid in recent years to the possible role of the altered blood calcium in the development of parathyroid and naphthalene cataracts. Although it has been shown that the senile and experimentally produced parathyroid cataract both contain large amounts of calcium, it has by no means been proved that the increase in calcium content is the cause of the cataract. From the work of Salit (1933), it appears that large amounts of calcium are deposited in the cataractous lens only in the later stages and that in the "incipient stage" the calcium content of the lens is scarcely higher than in the normal lens. This suggests to the writer that calcification of the cataractous lens is the result of degenerative processes and is not the *cause* of cataract.

The toxin theory of parathyroid deficiency presented earlier by Luckhardt and by Dragstedt is not now in popular vogue because of the seemingly overwhelming evidence in favor of the calcium theory. Nevertheless, the writer believes that in our search for the cause of parathyroid and senile cataract, we should pay stricter attention to the possible role of toxins. It is difficult to understand how glutathione could have partially disappeared from these cataractous lenses unless toxins do play a role in parathyroid deficiency.

It would seem, too, that cataract developing in rats kept on low vitamin G ("B_2") rations (Day and his coworkers, 1931) might well be explained by the "toxin theory." Although, in later years, this theory has had scant support, Chick (1933) has called attention to the possibility that pellagra may be caused by a toxic substance derived from a maize diet. Chick admits that the suggestion that pellagra may be caused by toxin derived from the diet (which can be corrected in the presence of certain foodstuffs, such as meat, milk, eggs, green vegetables, if given in sufficient quantities) is, at present, a speculation. It might nevertheless serve as a useful working hypothesis to those studying the etiology of pellagra, whether by the experimental or clinical method.

In a similar manner parathyroid cataract may well be caused by toxic substance brought about by faulty metabolism following removal of the parathyroids. Our findings on the partial disappearance of glutathione in parathyroid cataract would support this idea. It is an interesting fact recently expressed by Brand and Harris (1933) that the only three amino acids which seem to be available for purposes of detoxification in the human (glycine, glutamic acid, and cysteine) are the same as those which form glutathione. It is not surprising, then, that, if the toxin theory is correct, we should find this partial disappearance of glutathione from the crystalline lens in cataract. Perhaps in this case, too, glutathione is being removed in the process of detoxifying some now obscure substance, which is formed after the parathyroids are removed. This toxin theory of parathyroid deficiency in the etiology of parathyroid cataract is put forward by the writer in the hope that by its use researches in the etiology of cataract may be further stimulated. It may result in further progress toward the solution of the "mystery which at present shrouds the cause of the disease." Further, the general-toxin theory of parathyroid deficiency should be thoroughly tested (a thorough test has certainly never been made) before it is abandoned.

In acknowledgment, the writer wishes to express his thanks to Dr.

Peter Kronfeld for aid in the preparation of this manuscript, and to Dr. Arno B. Luckhardt for his unfailing assistance and encouragement in the carrying out of these researches.

Summary

Observations on the development of lenticular degeneration were made on five young and one adult parathyroidectomized dogs. These observations enabled the writer to conclude: (1) there is a characteristic change of the lens after parathyroidectomy in the young dog. The changes noted by the writer were strikingly similar to those described by Goldmann. (2) As Goldmann has expressed it, in the parathyroidectomized young dog "the sutures are the site of predilection for opacities." (3) These opacities may occur in parathyroidectomized dogs in which the tetany is controlled by a sour milk-bread-liver-diet. Additional support is added to the view that tetany, *per se*, is not the cause of the cataract. (4) It is suggested that stricter attention be devoted to the possible role of "toxins" in parathyroid cataract.

University of Chicago

Bibliography

Brand, E., and Harris M. Science, 1933, v. 77, p. 589.
Chick, H. Lancet, 1933, v. 225, p. 341.
Day, P. L., Langston, W. C., and O'Brien, C. S. Amer. Jour. Ophth., 1931, v. 14, p. 1005.
Eiseman, C., and Luckhardt, A. B. Proc. Soc. Exp. Biol. and Med., 1927, v. 25, p. 6.
Evans, E. I., and Kern, R. Amer. Jour. Ophth., 1931, v. 14, p. 1029.
Evans, E. I. Amer. Jour. Physiol., 1933, v. 105, p. 32.
Evans, E. I. 1934[a] (In preparation).
Evans, E. I. Proc. Soc. Exp. Biol. and Med., 1934[b], v. 31, p. 603.
Goldmann, H. Arch. f. Ophth., 1929, v. 122, p. 146.
Luckhardt, A. B., and Blumenstock, J. Science, 1922, v. 56, p. 257.
O'Brien, C. S. Arch. of Ophth., 1932, N.S., v. 7, p. 71.
Salit, P. W. Arch. of Ophth., 1933, v. 9, p. 571.

NOTES, CASES, INSTRUMENTS

AN UNUSUAL CASE OF PIGMENTATION OF THE RETINA*

CHARLES O. RICE, M.D.
BROOKLYN, N.Y.

The patient, a Polish-American girl aged 15 years, has vision of 20/20 to 20/40 in the right eye; 20/15 in the left eye. There is an exotropia of 30 centrads of the right eye. In the upper part of the fundus of the right eye are many spots of pigment, reaching as far as the equator. To avoid repetition I shall quote from Sydney Stephenson's report in the Transactions of the Ophthalmological Society of the United Kingdom, 1891, volume 11, and reproduced with a picture almost exactly like my case in Frost's Fundus Oculi,[1] 1896. "The fundus has scattered over it groups of pigment dots .5 mm. to 2 mm. in diameter, which may be black or dark brown. For the most part the individual dots are angular or irregular in shape, rather than round, and their diameter is usually less than that of the main retinal vessels. The dots are collected into groups; the fundus between the groups presenting nothing abnormal. Most of them appear to be deeper than the retinal vessels although there are occasional exceptions to this. They differ from pathological pigment deposits by the absence of any discoloration of the portion of the fundus on which they rest and by the sharp limitation of the individual dots, each having a well defined outline and being quite separate from its neighbors." Stephenson later published another similar case and still later saw four more. Jaeger[2] also published a similar case in his atlas. "Larger areas of pigmentation are occasionally met with in eyes which are presumably healthy. They are brown rather than black, and tend to have a regular oval or circular outline. They are probably analogous to moles on the skin."

Stephenson's conclusions are that condition is a nonprogressive, congenital deposit of pigment compatible with good sight and undiminished fields; in other words, it falls within physiological limits. In some of the cases seen by Stephenson the pigmentary changes reached beyond the equator of the eye. They may occur above or below the disc. In one case two pale yellow spots, each about 1 mm. in diameter, lie among the pigmentary deposits. Subjective symptoms in my case and all the reported cases were absent. Several relatives of the different persons were found to have some pigmentary deposits in the retina and on the disc. Stephenson saw three cases in 2500 eyes he examined.

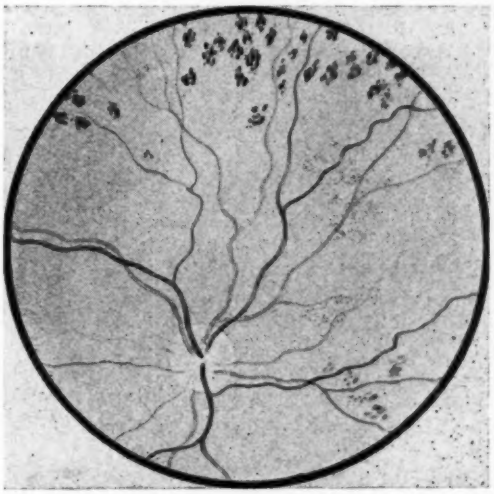


Fig. 1 (Rice). Unusual case of pigmentation of the retina.

61 Richmond Street.

References

[1] Frost, The Fundus oculi, p. 18 and plate x, figs. 28 and 29. Y. J. Petland, Edinburgh 1896.

[2] Jaeger, Ophthalmoskopischer Hand-Atlas, p. 126 und Tafel 16, fig. 76. Wien 1869.

* Read before the Brooklyn Ophthalmological Society, Oct. 19, 1933.

A FRAGMENT OF LENS CAPSULE IN THE ANTERIOR CHAMBER

AMBROSE EARL EDGERTON, M.D. AND CHARLES FULMER, M.D.
SAN FRANCISCO

The patient here described presented himself at St. Luke's Clinic complain-

ing of poor vision in the left eye. From his history, it was learned that he was born with congenital cataracts and that each eye was operated on when he was two years of age. Vision had always been poor in the left eye but his right eye, with correction, gave him 6/9 vision.

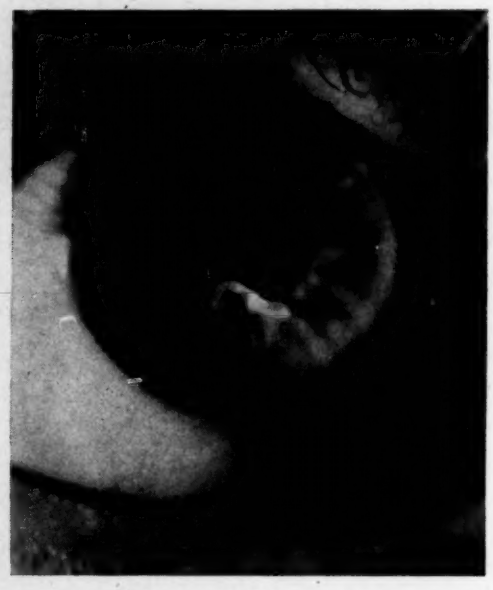


Fig. 1 (Edgerton). Fragment of lens capsule in anterior chamber.

The external examination of his eyes was negative except for a tremulous iris on the right side. The tension was normal and the rotations were full and free in all directions. The pupils were equal, round and reacted normally to all tests. Each cornea was clear. The tear sacs were open and the anterior chambers were deep.

Ophthalmoscopic examination of the left eye showed dense capsule remains and the fundus could not be seen. In the right eye, with a plus 20 in the ophthalmoscope, a peculiar white linear substance which was attached to the iris was noted just below the pupillary area. A few opacities were seen in the vitreous. The disc was oval, good color, with sharp edges. The vessels and fundus were negative.

Slitlamp examination of the right eye showed a clear cornea; the pupil was round and free. The aforementioned substance, 2.5 mm. in length, .25 mm. in thickness, lay horizontally, its midportion attached to the iris by a mass of golden brown pigment. Each end was loose and moved freely in the anterior chamber but without touching the cornea. The outline of this wavy white substance was clear-cut and smooth. At first it was thought to be a cysticercus or a cysticercus capsule, but x-rays of the head and shoulder of the patient did not reveal any calcified cysticerci in the muscles and the blood picture did not show any eosinophilia. Furthermore, there was no history of the right eye ever having been painful or inflammed. Consequently it was concluded that the substance was a part of the lens capsule.

450 Sutter Street.

SOCIETY PROCEEDINGS

Edited by Dr. H. Rommel Hildreth

ST. LOUIS OPHTHALMIC SOCIETY

February 23, 1934

Dr. E. E. Spitze, president

The external canthal ligament in surgery of the lower lid

Dr. H. R. Hildreth presented a paper on this subject which will be published in the American Journal of Ophthalmology.

Discussion. Dr. Hayward Post asked if the size of the palpebral fissure could not have been improved by a canthotomy.

Dr. F. E. Woodruff stated that he had seen this patient about sixteen days after the operation and again about a month later at which time the wound was hardly noticeable. The narrowing of the fissure he considered as unimportant.

Dr. H. R. Hildreth stated that in the few cases in which this operation had been used, it had seemed unnecessary to increase the size of the fissure. The external canthus was freed first, after which a "V" excision was made. The excision included slightly more than one-half the extent of the lid margin.

The site of action of drugs on the oculo-autonomic system

Dr. Carl Beisbarth showed the importance of considering the site of action of drugs in using them as synergists and as antagonists. The drugs were considered in four separate groups: Those which stimulated the sympathetic, those stimulating the parasympathetic, those paralyzing the parasympathetic and those acting on the muscle directly. He cited examples showing the use of these drugs as synergists and as antagonists.

Discussion. Dr. John Green cited a case which had passed through an acute attack of glaucoma in the left eye in which an iridectomy had been done with good result. A drop of two percent suprarenin bitartrate had been used in the right eye and two hours later, an acute attack of glaucoma with widely dilated pupil had developed. Repeated instillations of amineglaucosan had no effect in reducing the size of the pupil or lowering the tension, but a recovery was effected by a basal iridectomy. He asked Dr. Beisbarth to explain the lack of efficacy of amineglaucosan in this case.

Dr. H. Howard asked why Dr. Beisbarth had left ephedrin out of his list of mydriatics.

Dr. Carl Beisbarth stated that it was his belief that the reason amineglaucosan did not produce constriction in Dr. Green's case was because it was used with suprarenin bitartrate. Amineglaucosan would constrict a pupil dilated with atropin. In reply to Dr. Howard's inquiry he stated that ephedrin belonged in the adrenalin group.

Limbal fistula

Dr. C. T. Eber reported a case of this condition which will be published in the Americal Journal of Ophthalmology.

Discussion. Dr. Lawrence Post asked whether the hole showed light on transillumination and if there was a direct connection with the aqueous.

Dr. W. H. Luedde asked how large the openings described were.

Dr. C. W. Tooker reported that he had had the opportunity of seeing this patient before any operative procedures were undertaken. Some pigmentation had been noted at the bottom of this apparent hole under the bleb, which gave rise to the question as to this being a beginning malignancy.

Dr. C. T. Eber in closing stated that transillumination did not reveal any shadows. The scleral hole was discovered after the flap had been dissected back. Aqueous then came through the opening. In reply to Dr. Luedde he stated that most cases had multiple openings though cases with a single fissure had been reported.

J. F. Hardesty,
Editor.

NEW ENGLAND OPHTHALMOLOGICAL SOCIETY

December 19, 1933

Dr. Hugo B. C. Riemer presiding

Membranous conjunctivitis

Dr. Edwin B. Dunphy presented a six-year-old girl who came to the Massachusetts Eye and Ear Infirmary in 1928 at which time the diagnosis was made of membranous conjunctivitis with perforation of both corneae. Two weeks previous to admission she had developed a severe purulent conjunctivitis for which she was treated by her local doctor. Her condition apparently became rapidly worse as upon her arrival at the Infirmary she already had the corneal perforations. There was a grayish-white membrane on both lids of both eyes which could be pulled off, leaving a bleeding surface. The general physical examination was negative as well as the Wassermann and Von Pirquet tests and bacteriological studies. There was no history of eye trouble in the family.

In 1929 and 1930 she had recurrences which lasted several months. In 1931 she had another attack and an ophthalmologist took her to a hospital and scraped the lids free of the fibrous tissue which had grown on them. He did this on three different occasions with improvement, but the patient always relapsed into the former condition.

She came here in 1933 with a bad recurrence. The tuberculin test was negative. A biopsy of the lid showed inflammatory fibrous tissue infiltrated with polymorphonuclear cells and eosinophiles. Smears and cultures were made by Dr. King who found an organism of the coryne bacterium group (one of the diphtheroid group). It was decided to try x-ray treatment and the patient was given five treatments consisting of one-eighth of an erythema dose each time. Definite improvement followed but the patient was not entirely cured. All foci of infection and dietary faults had been eliminated.

Apparently there were two main types of membranous conjunctivitis. The first type was seen as an acute conjunctivitis caused by staphylococcus, streptococcus, pneumococcus, Klebs-Loeffler bacillus and Kochs-Weeks bacillus. Any of these organisms might produce a membrane on the conjunctiva for a short period. The second type was the chronic type associated with proliferation of fibrous tissue such as illustrated by this case and must be regarded as a manifestation of some general disturbance of unknown nature.

Cataracta electrica

Dr. Hugo B. C. Riemer presented a 40-year-old man who in May, 1933, came in contact with an exposed 220 volt electric wire causing shock and severe burns of the right temple near the outer canthus with necrosis of the bone, left upper lid and of the bridge of the nose. He was dazed but not unconscious, for a few moments. The conjunctiva of the right eye appeared parboiled; the left eye never showed any redness or inflammation. He was treated for the burns about two and one-half months. In the latter part of August, nearly three months after the accident, he noticed blurring of vision in the left eye.

Dr. Riemer saw the patient for the first time on September 7th at which time the vision in the right eye was normal. Vision in the left eye was fingers at four feet. There appeared to be an early traumatic cataract in the left eye. He was seen again by Dr. Riemer two months later and at that time the vision in the right eye was still normal; left eye, fingers at three feet. The right lens showed a small pinhead sized bubble in the center of the posterior portion. The left lens showed small white dots beneath the anterior capsule, and the cortex was more cloudy. On December 9th the left lens was greatly swollen so that the anterior chamber was practically obliterated. The tension was normal. One week later the patient had severe pain in the eye and the tension was 40 mm. (Souter). The patient was admitted to the hospital and Dr. Riemer performed a linear extraction of the lens.

Medullated nerve fibers

Dr. Juanita P. Johns presented a woman showing bilateral atypical med-

ullated nerve fibers. The medullated area presented a dense mass of grayish white fibers, completely surrounding the discs, obliterating their margins and the central vessels. Small segments of the vessels were noted here and there through the medullated field. The area extended for a distance of three disc diameters in all directions. The color of the field was grayish white with scattered pigment dots in the outer margin. The edges were fimbriated in their entirety.

Typical medullated nerve fibers did not obscure the disc; they extended out from the disc, above and below or in instances they appeared as islands away from the disc.

Field studies showed corresponding enlargements of the blind spots to the opaque areas described. The peripheral fields were normal for form and color. The visual acuity was normal and there was a very low error of refraction.

Thrombosis of the central retinal vein

Dr. Virgil Casten presented a 23-year-old man who came to the eye clinic one year ago complaining of poor vision in the left eye which came on following an acute cold, one week previous. The vision in the right eye was 20/15; left eye, fingers at three feet. The sinuses and Wassermann were negative. There were 3 to 4 diopters of papilledema of the left nerve head, with many nerve-fiber layer hemorrhages scattered throughout the fundus. Very marked dilatation and tortuosity of the veins were noted. The perivascular spaces were very much engorged. The patient was also seen by Dr. Verhoeff who felt he had a true thrombosis of the central retinal vein. The vision at the end of three weeks improved to 20/40 and one week after this was less than 20/200. Since then it had gradually improved, and when the patient was presented, his vision was right eye, 20/15; left eye, 20/20. New blood vessels had formed on the nasal side of the disc which gave the appearance of a collateral circulation. White sheathing could still be seen along the veins. Below the macula was a whitish patch of tissue that angled around the macula but did not interfere with the central vision. The papill-edema had completely disappeared.

Dr. James J. Reagan,
Recorder.

CHICAGO OPHTHALMOLOGICAL SOCIETY

February 26, 1934

Dr. Dwight C. Orcutt, president

Vernal catarrh

Dr. Philip Halper presented a 10-year-old boy, in whom vernal catarrh had first appeared five years previously in both eyes, with typical symptoms in the spring and summer; the rest of the year he was free from symptoms. About a year ago the condition became persistent, especially in the right eye. He developed papillary hypertrophies of the conjunctiva of the right upper lid which were treated with silver stick once a week and excision of the masses once a month. He had been under this treatment for about a year with no benefit. When the boy came under observation about three months ago, it was decided that because of the extreme irritation of the right eye radium should be used to get rid of the papillary hypertrophies. Dr. Halper mentioned a patient who was shown before the Society several months ago, with tremendous papillomatosis of the conjunctiva, which responded nicely to radium. The papillary hypertrophies in this case of vernal catarrh had diminished about 50 percent. The eye was not irritable, and instead of continuing with another series of radium applications, some other simpler form of treatment would be tried.

Discussion. Dr. Anton Elschnig (Prague) remarked that this was frequently a very difficult condition to treat. He preferred the use of a bandage; even if worn only a few hours at a time the condition was improved. He also used ichthyol or sulphur ointment. One never could tell how long it would take to clear up the disease.

Evulsion of the optic nerve and subsequent tissue proliferation

Dr. M. L. Folk presented a 16-year-old boy, with the history that at the age of 7 years, while bending to pick up a marble, his left eye was struck by a lead pipe, resulting in total loss of vision. Upon examination the right eye was normal. The left eye had no light perception. Externally the left eye was negative; the fundus showed a large gray mass, elevated about 10 or 12 diopters, occupying the place of the disc, and possibly a little more. At the outer temporal border there was some pigmentation and the vessels running into the disc area from above showed some pigmentation and were accompanied by white streaks. The rest of the fundus was normal. There had been no change noted since the patient came under observation.

Tapeto-retinal degeneration

Dr. Louis Bothman said that his patient was first seen in September, 1930, when 21 years of age. When 6 years old he had had scarlet fever, since which time he had been myopic 7.5 diopters in the right and 6.5 diopters in the left eye. The best vision obtainable was .4—2 in each eye. The fields had become progressively smaller and had central scotomata. Subsequently Bjerrum screen tests had been made, showing a small central seeing area and a seeing crescent in the nasal periphery of both eyes. The fundus picture was that of myopic conus with very narrow granular pigment streaks running temporalward from the disc and slightly radial in distribution. These pigment streaks were in the deep layers of the retina. The choroid was atrophic below it and appeared greenish in color. In many places there were small flecks of pigment lying on and along the blood vessels in the periphery. The discs were pale in the temporal halves and the lamina clearly visible. The fundus picture was unaltered in two and one-half years, though the field loss had progressed. The mother and one sister were myopic, and the brother and father were far-sighted with good vision. The father's fundi were normal.

Discussion. Dr. Anton Elschnig said that the condition was probably congenital because it was bilateral, and was a very unusual type of fundus. It was most likely a form of tapeto-retinal degeneration.

Robert von der Heydt

NASHVILLE ACADEMY OF OPHTHALMOLOGY AND OTOLARYNGOLOGY

January 15, 1934

Dr. F. E. Hasty, chairman

Three cases of bilateral cataract, possibly due to prolonged exposure to excessive heat

Dr. Fowler Hollabaugh said that his first patient was a white man aged 49 years, who complained of a gradual loss of vision. The onset was six years ago. There was a history of having worked in an iron foundry for 16 years before an open furnace. Following this he was employed in a chemical concern where he was exposed to fumes of sulphuric and hydrofluoric acids. The examination revealed bilateral mature cataracts; vision was reduced to counting fingers at two feet. A complete physical examination was negative. A combined extraction was done on the left eye.

Another white man aged 25 years, gave a history of having worked in an iron foundry in front of an open furnace radiating extreme heat for 12 months prior to the failure of vision in both eyes. His vision had always been defective although he completed the 9th grade in school. Three months before the first examination there had been more rapid failure. The examination revealed bilateral aniridia with upward luxation of the opaque lenses. This patient had fair vision for 23 years before the onset of the cataract.

The third patient was a 45-year-old man who had operated an old-type motion picture machine for six years. An excessive amount of heat radiated from this particular model. There was bilateral mature cataract; vision in the right eye was counting fingers at one foot and 20/200 in the left eye.

The three cases were under the usual cataract age and had been exposed to excessive heat prior to the development of the cataracts.

Discussion. Dr. W. G. Kennon mentioned a case he had examined in April, 1931. The patient was a white man aged 52 years. He had been in charge of a heating plant in a large office building. It had been his custom to examine the condition of his fires through a small opening in the furnace doors and he almost invariably used the right eye for this inspection. The vision in the right eye was reduced to light perception; left eye was 20/20. A nuclear opacity was observed in the right lens with clear cortex which became opaque during the following year. The left lens had remained uninvolved.

Kate Savage Zerfoss,
Secretary.

NASHVILLE ACADEMY OF OPHTHALMOLOGY AND OTOLARYNGOLOGY

February 19, 1934

Dr. F. E. Hasty, chairman

Oculo-glandular tularemia treated with anti-tularense goat serum

Dr. H. C. Smith said that in February, 1932, Dr. Lee Foshay of Cincinnati, in the Journal of the American Medical Association, published a preliminary report on the treatment of tularemia by the injection of serum from sensitized goats. The following October, in the Journal of Infectious Diseases, Dr. Foshay described the use of his serum as an aid to early accurate diagnosis of the disease. He recommended the intradermal injection of .01 cc. of a dilution of 100,000,000 organisms per cubic cm. The reaction to this test was positive only in the presence of tularemic infection. Consecutive daily subcutaneous injections of small amounts of the serum would produce artificial desensitization with cessation of symptoms. However, this required an extremely long time, and Foshay did not feel that it was an adequate form of treatment.

In the Journal of the American Medical Association for November 4, 1933, Foshay presented further data on the treatment of tularemia by the injection of goat serum. He recommended intravenous administration as preferable after diagnosis had been confirmed by the intradermal test and by agglutinin test. Because of the fact that the skin test was often positive earlier than the agglutinin test it should always be employed. In his last article Foshay advised intravenous injection of 15 cc. of the serum (which was obtained after subcutaneous injection of formaldehyde-killed suspensions of Pasteurella tularensis) on two consecutive days. He claimed that rapid fall in temperature with marked diminution in size of enlarged lymph nodes and disappearance of pain at the sites of glandular enlargements would result; that the primary lesion would heal rapidly and that the leucocyte count would fall; that the serum had a desensitizing action as would be demonstrated by a negative skin test three to four days after the injection. He also claimed that the titre of agglutination might be raised or lowered or might disappear entirely. The most striking claim was that the duration of the disease could be reduced by one-half, and that prolonged distress and death could be abolished by early employment of the serum in diagnosis and treatment.

Ten months before Foshay's last publication appeared, a patient with oculoglandular tularemia was treated with the serum at Vanderbilt Hospital. Mrs. G. D., aged 27 years, was admitted to the hospital with a history of having cleaned a rabbit two weeks earlier. Two days afterward she had developed general malaise and pain in the right eye. Soon the eyelids had become swollen and a discharge appeared. This was followed, a little later, by painful swelling in the right side of the neck and in front of the right ear.

Upon admission the patient's temperature was 101° and the leucocyte count was elevated to 13,300. General examination was negative except for the right eye and the swollen preauricular and superficial lateral cervical glands of the right side. The eye presented moderate swelling of the upper lid with

considerable redness, and there was a fair amount of this yellowish conjunctival discharge. On eversion, the upper and lower tarsal and retrotarsal surfaces presented sloughing ulcers ranging from pin-point to 3 mm. in diameter. On the lower cornea there was a large superficial ulcer, the margins of which were discolored, apparently from argyrol.

The disease was thought to be tularemia, and the patient was isolated. For the eye, warm irrigations every hour followed by the instillation of one percent mercurochrome at three-hour intervals, and instillation of one percent atropine solution three times daily were prescribed. Systemically supportive treatment was begun.

The second day the agglutination test was positive to a dilution of 1:20. On the third day 12.5 cc. of Foshay's serum was given intravenously. The patient developed severe urticarial rash and the temperature rose to 104° so adrenalin was given and repeated after one hour. In seven hours the temperature had dropped to 102°. On the fourth day there was slight improvement in both general and ocular condition and the temperature did not rise above 101° degrees. On this day, two small hard nodules were discovered under the skin of the upper lid near the outer canthus. There was no reaction.

Twelve days after admission the patient's temperature was normal and she was feeling fine. The ocular lesions were practically healed and the cervical and preauricular glands were disappearing. A skin test with .05 cc. of the tularemia antigen was not positive. The agglutination titre had been raised to 1:2560. Twenty-four days after admission the patient was discharged as cured. The temperature had remained normal after the twelfth day, the agglutination titre had increased to 1:40380, leucocytes had fallen to 6,850. Both the ocular and glandular lesions had rapidly cleared.

During the first week of hospitalization, Dr. William Litterer inoculated three guinea pigs with 3 cc. of defibrinated blood of the patient and was able to produce the disease in other pigs by inoculation with material from the liver and spleen of the first pigs that died. The second group, at autopsy, presented typical findings of tularemia, and from cultures from their livers and spleens on suitable medium the Bacterium tularense was recovered.

Comparing this patient's period of hospitalization with the average for twelve patients admitted to the Vanderbilt Hospital with a diagnosis of tularemia, it was found that it exceeded by seven days that of the average. However, this patient was in all probability able to leave the hospital earlier than the date of her dismissal. She was observed for some time on account of the interest attached to the use of the serum. All of the points in favor of the use of his serum that were mentioned by Foshay, except reduction in the period of hospitalization, were observed in this case.

Kate Savage Zerfoss,
Secretary.

LOS ANGELES SOCIETY OF OPHTHALMOLOGY AND OTO-LARYNGOLOGY

February 26, 1934

Dr. F. H. Brandt, president

Results of Professor Elschnig's operative clinic

A clinical meeting was held consisting of cases operated on by Professor Anton Elschnig at the Los Angeles General Hospital during the Mid-Winter Course of the Research Study Club. The cases were presented by Dr. Helen Preston and Dr. John Bullis, residents in ophthalmology.

An outline of Dr. Elschnig's preparation of the patient was given. This consisted in culture of conjunctival sac two days before operation, use of mercury oxycyanide 1-5000 every hour during daytime for two days, irrigation of lacrimal sac, recording of tension, and slitlamp study. Three grains of sodium amytal were given the night before and two hours before the operation. All patients whose systolic blood pressure exceeded 165 had venesection and withdrawal of 150 c.c. of blood 30 minutes before operation.

The local eye preparation consisted

of shaving the brow, clipping lashes, scrubbing of skin with cocoa base soap and 1-5000 mercury bichloride solution. Then 25 percent argyrol was instilled into the conjunctival sac and irrigated with one-half normal saline solution. Cocaine 5 percent was instilled for local anesthesia. With tooth-pick applicators wrapped in cotton the lid margins were finally scrubbed with benzine followed by 5 percent tincture of iodine. Homatropine 2 percent was instilled 30 minutes before operation.

Immediately after the preparation akinesia was obtained by the Van Lint method and a retrobulbar injection of 2 percent novocaine with adrenalin was made. This procedure was followed for all intraocular surgery.

Twelve cataract cases, one case of iris cyst, and two cases of uncompensated glaucoma were operated on. Of the twelve cataract patients, there was one case of mature senile cataract, one case of hypermature senile cataract, one case of immature cortical cataract, six cases of immature complicated cataracts, and three cases of mature complicated cataracts. The cases were selected for their complexity rather than for their simplicity.

Eight patients were delivered by the Elschnig intracapsular method with iridotomy and round pupil with 20/20 to 20/30 vision on first refraction. One case was delivered by combined extracapsular extraction method and had 20/30 vision. Another patient, a young woman, was operated on by linear extraction and suction, with 20/20 vision resulting. Two patients with immature complicated cataract were operated on by combined intracapsular extraction with resulting 20/30 and 20/40 vision.

In the case of acute glaucoma, Professor Elschnig made the incision with a scalpel back of the limbus to arrive at the exact base of the iris with the incision and then he performed a broad iridectomy leaving the distal pillar of the iris in the wound. The other case of uncompensated glaucoma was in the subacute stage and cyclodialysis was performed separating the ciliary body by means of a specially devised curved spatula enabling the operator to obtain a wide sweep and a broad separation in excess of one quadrant. The tension was successfully reduced in both eyes.

A male patient aged 39 years with a cyst of the iris following removal of a traumatic cataract caused by an intraocular foreign body was operated on for removal of the cyst. Professor Elschnig made the incision again from without inward by means of a scalpel. The anterior wall of the cyst was separated from the cornea and the cyst grasped with forceps for excision. Considerable vitreous was lost and the postoperative reaction had been severe and had not yet subsided.

There was no vitreous loss in any case except that of the iris cyst. In one cataract case done by Elschnig's method there was a prolapse of the iris on the first postoperative day. Attempts to replace it being unsuccessful it was excised and a bead of vitreous escaped. Later a small subchoroidal hemorrhage was observed but this absorbed and the final result was 20/30 vision.

Discussion. Dr. William Boyce discussed certain features of Elschnig's technic, mentioning particularly the manner in which Professor Elschnig grasped the lens capsule, counting eight as he rotated the lens from side to side at the same time lifting up gently. The zonule ruptured and the lens was expressed by means of a strabismus hook, so that no force was exerted on the capsule as the lens was lifted out by means of the forceps. Dr. Boyce also commented upon the method of entering a shallow anterior chamber with a scalpel, a distinct advantage in these cases. He also emphasized the wide sweep made in separating the ciliary body in cyclodialysis.

Harold F. Whalman,
Recorder.

ROYAL SOCIETY OF MEDICINE, LONDON

Sections of Ophthalmology and Dermatology

February 9, 1934

Mr. A. C. Hudson presiding

Acne rosacea

Dr. H. C. Semon said that so many predisposing factors had been men-

tioned in relation to the causation of rosacea that the only way to reconcile them seemed to be to assume that nervous disturbances occurred at the periphery of a reflex arc in the sympathetic nervous system. The flushings suggested the intervention or the association of angioneurotic factors. The abnormal stimuli ultimately led to chronic stasis and congestion, as shown by the capillariscope. This congestive state led to disturbances of secretion, and predisposed to infection of the sebaceous glands. It was at this point that the symptoms of rosacea became apparent, possibly with, as a final result, rhinophyma. This idea received further support from the fact that the symptoms were also aggravated by emotion, heat, light and cold. A beneficial result was obtained by treating carefully with graded doses of x-rays, which inhibited the excessive sebaceous activity.

Most cases of rosacea were soon relieved, if not permanently cured, by careful attention to the patient's diet. His own practice was to give carbonate of magnesia with bismuth, with or without a little bromide and valerian in emotional cases, for a week or two before starting with the administration of hydrochloric acid. Patients with this condition must rigidly abstain from alcohol, from coffee, and especially from strong tea, as he regarded the last-named as a more important causative factor than alcohol. Condiments and pickles, if taken, must be only sparingly eaten; drinks were best taken cold or tepid. Constipation and all septic foci must be dealt with. Local applications containing ichthyol and one percent lead in calamine lotion were valuable in acute or irritable cases. For the more chronic varieties sulphur and resorcin were good; on the other hand, resistant cases and those in which a seborrheic element was pronounced were usually benefited by graded doses of x-rays.

Dermatitis of eyelids might be either of primary or secondary origin. He considered that most of the primary cases resulted from the action of an irritant, i.e., they were caused by the antigen reacting in a delicate epidermal structure, or in a predisposed person. It could be understood how, the eyelids being so delicate, they should be first to show signs of irritation to exogenous irritants. Most bacterial cases were secondary to some such condition as seborrhea. When once acquired, the allergy of an individual might be extreme. Infections of the scalp and of the face were often associated with a marginal blepharitis. He considered that the degree of eyelash destruction present in any given case was an index of the severity of the infection, and so was a guide as to prognosis. Treatment in these cases must be persistent, as it was a case of dealing with a diathesis. Few well-established and chronic cases were really cured. Sulphur remained the best of the local remedies, but it should not be employed in concentrated form, and signs of irritation must be watched for. Good substitutes were resorcin and salicylic acid. Sulphur spas were also good.

Discussion. Mr. R. Affleck Greeves remarked that the lesions of acne rosacea resembled those of phlyctenular disease. Corneal lesions were commonest; if ulcers formed they usually proved very stubborn. After healing, an appreciable scar might be left, and if this was central in position, sight was liable to be seriously hampered. Another form of the disease began as an infiltration of the corneo-scleral junction. Lesions like those in phlyctenular disease responded best to stimulation. Yellow oxide of mercury ointment, with atropine to relieve the pain of photophobia was recommended. He did not believe in carbolising the ulcers. He had found the greatest relief followed the application of x-rays; the doses he usually gave varied from one-sixth to one-third of a Sabouraud pastille, and not more often than once a fortnight. To such a small dose there was practically no reaction.

Dr. Sybil Eastwood said that through the kindness of Dr. A. M. H. Gray, of University College Hospital, she had been able to study a large series of cases of rosacea, and she found that in 95 percent of them there was some digestive disturbance. In the long-standing cases the underlying factor was some vascular congestion, arising in most of

the cases from the stomach. Some 48 percent of the cases either had achlorhydria or the amount of their hydrochloric acid was very low. After treating the stomach condition the effect on the rosacea had been good.

(Reported by H. Dickinson)

ROYAL SOCIETY OF MEDICINE, LONDON

Section of Ophthalmology

March 9, 1934

Mr. A. C. Hudson, president

Osteoma of the ethmoid

Mr. Duncan Fitzwilliams said that the patient, a woman aged 51 years, had complained of giddiness, and pain on the left side of the head. The left eyeball had protruded for six months. When she rubbed the left eye she saw sparks. There was difficulty in lowering the left upper lid. X-rays revealed the tumor, and the question was as to whether operation would be best done through the cerebral fossa, or through the front of the orbit.

At the operation an incision was made from the centers of the supra-orbital ridge to just above the inner canthus. Bone was chiselled off, leaving the pulley intact. The periosteum was elevated from the inner side of the orbit until the osteoma could be felt, then the tumor was loosened from the thin bone at the inner side of the orbit. Double vision persisted for a month after the operation.

If, he said, a tumor was small enough to be delivered through the orbit without damaging the latter, this was the best route, even if the orbital outlet had to be considerably enlarged by removal of bone from its inner margin. Any trans-frontal approach involved the turning back of osteoplastic flaps, the raising of the frontal lobes, and the removal of the roof of the orbit.

Tonic pupil

Mr. A. Lister said that this condition had been described under many names, and that there were two forms, complete and incomplete. The only symptom complained of might be discomfort, and mistiness of vision if the accommodation was lost. In most of the cases no hereditary nor constitutional disorder was present. The cause was unknown. The onset might be either sudden or gradual; in some cases the patient had always had the condition. There were no complications, and improvement tended to take place in the course of years. In almost all cases the pupils were dilated. There was no real similarity between this type of pupil and the Argyll-Robertson pupil; and diphtheritic paralysis bore no relation to it.

Infantile cerebro-macular familial degeneration (Tay-Sachs disease)

Mr. Victor B. Purvis said that the patient was a female child aged 11 months. Four months ago she was taken to a hospital because she was slow in learning, and the condition was diagnosed as Tay-Sachs disease. At that time the child seemed healthy generally, but had since become weaker, and had some digestive trouble. Both fundi showed the typical picture of the disease. The macula stood out as a dull red spot one third of a disc in diameter, surrounded by a white opaque area extending midway between the macula and the disc. The optic discs were not yet grossly affected, but there was definite pallor of them. She was the third and youngest child of Jewish parents: the parents were not consanguineous. The eldest sister died of Tay-Sachs disease, but all other members of a prolific family had been free of the disease for three generations.

Contact glasses

Mr. F. A. Williamson-Noble presented a woman who had been wearing contact glasses since February, 1932. In the right eye she had 13 D. of myopia, and 4 D. of myopic astigmatism: in the left eye 10 D. of myopia, 1 D. of myopic astigmatism. In the left fundus was old chorioretinitis. The right eye, with correction, read 6/12, the left read 6/24: and with a contact glass both eyes read 6/12.

(Reported by H. Dickinson)

AMERICAN JOURNAL OF OPHTHALMOLOGY

PUBLISHED MONTHLY BY THE OPHTHALMIC PUBLISHING COMPANY

EDITORIAL STAFF

LAWRENCE T. POST, Editor
640 S. Kingshighway, Saint Louis

WILLIAM H. CRISP, Consulting Editor
530 Metropolitan building, Denver

EDWARD JACKSON, Consulting Editor
1120 Republic building, Denver

HANS BARKAN
Stanford University Hospital, San Francisco

HARRY S. GRADLE
58 East Washington street, Chicago

H. ROMMEL HILDRETH
824 Metropolitan building, Saint Louis

PARK LEWIS
454 Franklin street, Buffalo

M. URIBE TRONCOSO
350 West 85th street, New York

M. F. WEYMANN
903 Westlake Professional building, Los Angeles

JOHN M. WHEELER
30 West Fifty-ninth street, New York

EMMA S. BUSS, Manuscript Editor

Address original papers, other scientific communications including correspondence, also books for review and reports of **society proceedings** to **Dr. Lawrence T. Post, 640 S. Kingshighway, Saint Louis.**

Exchange copies of medical journals should be sent to **Dr. William H. Crisp, 530 Metropolitan building, Denver.**

Subscriptions, applications for single copies, notices of change of address, and communications with reference to advertising should be addressed to the **Manager of Subscriptions and Advertising, 640 S. Kingshighway, Saint Louis.** Copy of advertisements must be sent to the manager by the fifteenth of the month preceding its appearance.

Authors' proofs should be corrected and returned within forty-eight hours to the **editor.** Twenty-five reprints of each article will be supplied to the author without charge. Additional reprints may be obtained from the printer, the George Banta Publishing Company, 450-458 Ahnaip street, Menasha, Wisconsin, if ordered at the time proofs are returned. But reprints to contain colored plates must be ordered when the article is accepted.

LIGHT AND COLOR SENSE

Living matter is widely sensitive to electro-magnetic radiations, or vibrations. The effects of heat, light and the x-ray, and radium emanations, that are now understood, show the great range of this sensitivity. Vision depends on the special adaptation of the eyes to radiations of certain wave lengths. Every one who uses a radio set knows how important it is to get accurate adjustment for the kilocycle frequency of the station he wants to hear. Any mixture of wave frequencies brings confusion and the listener hears nothing.

The first step in the evolution of the eye was the production of a tissue sensitive to certain radiations and insensitive to all others. The eye thus has the power to pick out and discriminate certain wave-lengths, which we call light. These wave-lengths are all within one "octave," of the more than fifty "octaves" of electro-magnetic vibrations that have been recognized and measured by the methods of experimental physics. The shortest wave-length of violet that the eye can perceive as light, 390 millimicrons, is more than half as long as the longest wave-length of red light 770 millimicrons that can be seen. We know from music how similar are the sounds of notes that vary just an octave in pitch, giving perfect chords. Looking at the solar spectrum, we can see in the violet end, as it fades out, how similar in appearance it becomes to the red end. If it were possible to see several octaves of the solar radiations, the confusion might be as great as the interference of "static" with the radio.

With the production of the sensitive retina and its sensitiveness confined to one octave of radiation, it was important to protect the retina from radiations so close to light as might cause confusion. The infrared, or heat radiations, are taken care of by the circulation of blood, that keeps the various parts of the body at approximately one temperature, most favorable for the continuance and balance of the different processes of metabolism. The ultraviolet radiations near the other end of the light spectrum, are

prevented from reaching the retina. The great mass of them are "absorbed"—converted into other forms of force—by the corneal epithelium. This is directly derived from the primitive ectoderm.

It is probable that this selective power of the ectodermal layer early became a dominating factor in the selection of light radiations, that fixed the limits of visible wave-lengths. Such ultraviolet radiations as do pass through the corneal epithelium, are arrested and altered by the crystalline lens—a later derivative from the ectodermal epithelium. The lens has the notable power of fluorescence, changing invisible radiations into light of bluish or greenish color.

There is no known evidence that eyes of lower animals perceive radiations outside the spectrum of colors known to the human eye. Even the phototropism, turning to light, or the turning from light, of the youngest fish, seems to be due to the wave-lengths that are known to us as light. Experiments as to sight in birds and insects seem to indicate the same limits of vision as for the human eye. It would appear that living matter in general has a fixed relation to the visible radiations known as light, and that evolution has worked out, in the eye, an organ quite fitted to utilize the serviceable radiations, and exclude those that might be confusing and dangerous. This basis, in evolution and physiology, should be made the starting point for all schemes to "protect" the eye from radiations that might be harmful.

Evolution, that has confined vision to the use of such limited range of wave-lengths of radiations, has given us a wonderful variety of sensations that may be perceived within the limits of visible light. These sensations depend on the discriminating powers of the visual brain centers. All consciousness of sensations comes through the brain; and the evolution of minute brain structure is but little known. Probably variations in the power to discriminate and recognize color, depend upon differences in brain organization, rather than upon differences in the retina, or the impressions made upon it. Cerebral irritation and fatigue are the immediate causes of pain, or discomfort, that are blamed to excessive stimulation of the retina by light. The nerve element is predominant in photophobia and in color perception. This too must be borne in mind, in connection with the problem of relief from symptoms ascribed to excessive light. Edward Jackson.

1934 MEETING OF THE AMERICAN OPHTHALMOLOGICAL SOCIETY

A more delightful spot for a medical meeting in the month of July than the Seigniory Club, Lucerne-in-Quebec, Canada, could not be imagined. The Log Chateau situated on the Ottawa River, and surrounded by an immense wooded tract containing numerous lakes, was the location of the seventieth annual meeting of the American Ophthalmological Society. Recreation in the form of hiking, tennis, swimming, boating, and golf was enjoyed by those in attendance. It seems to the writer that a great advantage lies in holding a medical meeting in some such isolated club or resort, rather than in a large city because under such conditions there is a greater tendency for the members to gather in informal discussions, in addition to the sessions, than in a city where too many distracting amusements are offered to fill the time not occupied by the sessions. Also those members who reside in the city chosen for the meeting usually have their time partially absorbed by trying to maintain a semblance of a practice during the meeting and do not enjoy the full advantages thereof.

The scientific session, which occupied three mornings as usual, was represented by twenty-six papers. When possible, these were so arranged as to fall in groups where similar subjects were under discussion. It would have been difficult to choose any papers which might have been omitted, but a certain amount of tension was produced by the knowledge that such a large number of papers had to be read and discussed in a given length of time. This feeling doubtless cut down or caused the omission of some valuable discussion of those

papers which were read early in the day before it was certain that there was ample time to complete that day's program. This is a very common fault of most medical meetings of the past few years.

A very commendable feature of the scientific session was the strict observance of the time limit for each paper. Such rigid enforcement of time limits should be incorporated into all medical sessions. This would soon lead the readers of papers to arrange them in such a manner that they could be concluded in the time assigned for them and would permit other members to have the benefit of valuable discussions which is lost when the reading time is exceeded.

The nominations for officers for next year by the council were: for President, Dr. Walter B. Lancaster of Boston; for Vice-President, Dr. Louis B. Greene of Washington, D.C.; for Secretary-Treasurer, Dr. J. Milton Griscom of Philadelphia, and for Editor of the Transactions, Dr. Bernard Samuels of New York City. These nominees were elected unanimously. The total registration was considered unusually good, being seventy-five. It was decided to hold the meeting next year at Hot Springs, Virginia, on Wednesday, Thursday and Friday preceding the week of the meeting of the American Medical Association at Atlantic City so that those members who wish to attend both meetings might do so in one trip away from their offices. In these times of financial stress such a move by the council should be appreciated, particularly by those members who live in the west or at a great distance from the proposed place of meeting of these societies.

The probable dates of the 1935 meeting will thus be June 5th, 6th and 7th.

It was also decided to retain exclusive publication of candidates' theses in the Transactions in spite of the increased cost of such publication.

M. F. Weymann.

PREVENTION OF CONGENITAL SYPHILIS

At the 1933 meeting of the American Medical Association resolutions were introduced by the representatives of the Section on Ophthalmology requesting the House of Delegates of the American Medical Association to appoint a committee to take under advisement the subject of the control of congenital syphilis through the cooperation of the American Medical Association, the National Society for the Prevention of Blindness, the American Social Hygiene Association, the obstetric and ophthalmologic societies and such other organizations as might help.

As a result of these efforts the American Medical Association and the National Health Council have entered upon a joint intensive campaign for the prevention of congenital syphilis. Announcement of this was sent out by the National Health Council in a letter dated July 27, 1934, in which it was requested that all possible editorial publicity be given to this campaign.

That such an endeavor will have the sincerest indorsement of every ophthalmologist need not be said, for no one appreciates the toll in health and happiness taken by congenital syphilis more keenly than those of our specialty. One of the editors of this Journal, Dr. Park Lewis, has recently brought to the attention of our readers some of the important data on this subject. (Amer. Jour. Ophth., v. 17, no. 5, p. 444.)

Some of the figures on congenital syphilis are astonishing; for example, at least two percent of the children of the United States have this disease. Nearly ten percent of the women attending prenatal clinics have syphilis and if untreated, 85 percent of the pregnancies end in misfortune! On the other hand in from 90 to 95 percent of cases, if syphilis in the pregnant mother is treated, a non-infected child will be born. The fact that there is an exact method of making a diagnosis of this condition and that such brilliant results are possible from treatment, renders the undertaking of prevention of this scourge most worth while and hopeful.

The program of activities of the campaign includes two general objectives, first that physicians should be adequately instructed regarding the diagnosis and treatment of syphilis in pregnancy

and should be able to perform the necessary technics and second that the public should be taught the value and necessity of serologic tests in pregnancy.

The actual administration of the medication does not lie in the field of the ophthalmologist but that part of the proposed program which has to do with activities in local medical societies and in his clinical contacts, offers an opportunity which he, as one especially conversant with the ravages of the disease, is well qualified to utilize. Through special committees of these societies plans can be arranged for consultation with nonmedical organizations for the purpose of presenting this subject to laymen and through talks and writings to educate them to the vital importance of the prevention of syphilis. Ophthalmologists should be and will be leaders in this proposed campaign.

Lawrence T. Post.

BOOK NOTICES

Atlas of external diseases of the eye. By Humphrey Neame. 110 pages. 51 colored plates. P. Blakiston & Son Inc., Philadelphia, 1934. Price $5.00.

This atlas illustrates very beautifully in colors pathological conditions of the anterior segment of the eye. A short description of the condition with diagnosis, etiology, pathology, prognosis and treatment is given in most cases. It is doubtful whether this book would be of great value to the practising ophthalmologist but will be very useful in the teaching of beginners in ophthalmology. Tabloid information always appeals to the medical student and when accompanied by as good illustrations as are here shown there is real justification for publication. Lawrence T. Post.

Guibor fusion cards. By G. P. Guibor, M.D. Arranged according to the routine used at Northwestern University. Distributed by Belgard-Spero Inc., 30 N. Michigan Blvd., Chicago, Ill. Price, with holder, $3.50.

The set consists of fourteen large cards and thirty-three double, small cards; an isinglass holder for the smaller cards and a set of directions. This set should be ranked among the best. The cards are well chosen and carefully printed. Criticism might be made of a few. The description of the chart which is supposed to be used to determine the difference in size of retinal images is not clear. In fact, the entire descriptive pamphlet shows evidence of carelessness in English and proofreading which, though a minor point, should be corrected in future pamphlets.

Another suggestion would be that indestructible tabs be placed on the movable small pictures as they will scarcely stand the handling incident to repeated placement and removal from the celluloid container. Loose, small pictures are undesirable equipment in general for a clinic because of misplacement, tearing and soiling but no better method of fusion training than by these little cards has been found.

The set is a good one and may well be added to the ophthalmologists collection. Lawrence T. Post.

CORRESPONDENCE

The dispensing of glasses

Editor American Journal of Ophthalmology:

At odd times one may read a dissertation (usually by a metropolitan author) on the ethical status of the ophthalmologist who dispenses the glasses ordered for his patient. As a rule, such dissertations have not been exactly charitable to the dispensers,—mostly small town men; and in a reply, which I made some time ago, I pointed out that the small town men would doubtless subscribe to the dictum of their metropolitan confreres if commensurate fees, for good work, and the necessary facilities were available. And there's the rub. In Dr. Crisp's recent discussion of "Problems in Rebating" (Amer. Jour. Ophth., 1934, v. 17, no. 7, p. 645.) the above handicaps are largely conceded; but he feels that replacements are hardly within the reservation. Academically, perhaps not. But this is not an academic world (the Washington "brain trust" excepted); and in matters of merchan-

dizing,—like replacements of lenses it follows hard and fast business rules of cost plus.

Let us now suppose that John Doe needs a new compound lens. He must get it from one of three sources: The grinder of such lenses; the retail optician; or the doctor who originally prescribed it. The grinder will make it only on the order of the retailer, or doctor, from whom the formula came. The retailer will exact the retail price. The doctor is thus "on the spot" between the lens grinder and the retailer. He knows that the grinder, in any event, will get his "cost plus." He also knows the retailer as a part time competitor (especially if an optometrist) who would reap where he had not sown; and thus feels that any "plus" should not be his. What to do about it? No fixed rule can be laid down,—circumstances must govern. When the customer comes to the doctor for it, the check up with the record, plus notation of present conditions, entitles the doctor to a fee, which may be (usually is) added to the grinder's price; and the total designated on the order, which is to be collected by the grinder,—to simplify bookkeeping, and insure a cash transaction. When the customer goes direct to the grinder (as many do), the grinder notifies the doctor; and then a number of things must be considered, to wit: The customer's ability, and disposition to pay; the possibility that he has already gotten more in attention, and consideration, than he has paid for; and the doctor's chance of being known as a "cut price" man.

Not infrequently it's something like a Chinese puzzle,—this determination of where the "plus" (and the optical trade objects to its abolition as a habit) should go. But doctors seldom get unearned money; and, thus, it would seem better to "let sleeping dogs lie."

H. B. Young.

Burlington, Iowa.

ABSTRACT DEPARTMENT

EDITED BY DR. WILLIAM H. CRISP

Abstracts are classified under the divisions listed below, which broadly correspond to those formerly used in the Ophthalmic Year Book. It must be remembered that any given paper may belong to several divisions of ophthalmology, although here it is only mentioned in one. Not all of the headings will necessarily be found in any one issue of the Journal.

CLASSIFICATION

1. General methods of diagnosis
2. Therapeutics and operations
3. Physiologic optics, refraction, and color vision
4. Ocular movements
5. Conjunctiva
6. Cornea and sclera
7. Uveal tract, sympathetic disease, and aqueous humor
8. Glaucoma and ocular tension
9. Crystalline lens
10. Retina and vitreous
11. Optic nerve and toxic amblyopias
12. Visual tracts and centers
13. Eyeball and orbit
14. Eyelids and lacrimal apparatus
15. Tumors
16. Injuries
17. Systemic diseases and parasites
18. Hygiene, sociology, education, and history
19. Anatomy and embryology

---

4. OCULAR MOVEMENTS

Caocci, G. **A case of external bilateral congenital ophthalmoplegia.** Riv. Oto-Neuro-Oft., 1934, v. 11, March-April, pp. 162-171.

A man thirty-five years of age had had, as long as he could remember, a slight drooping of both upper lids and very limited excursions of the eyeballs. The lids could be closed very slowly. There was no diplopia, the corneal sensibility was normal, the pupils reacted normally, and the vision of either eye was 9/10. The cause the author regards as aplasia and hypoplasia of the fourth and sixth nerves, and of the cells of the oculomotor, while Perlia and Edinger-Westphal nuclei are not affected. (One figure, bibliography.) M. Lombardo.

Davis, F. A. **Modification of Jameson recession operation for strabismus.** Arch. of Ophth., 1934, v. 11, April, pp. 684-687.

The modification consists of placing the conjunctival incision over the insertion of the muscle, making lateral diagonal cuts in the capsule, using Reese's method of suturing the tendon, and suturing the conjunctiva separately. (Drawings.) J. Hewitt Judd.

Loozshinskii, G. **The relation between convergence and accommodation.** Sovietskii Viestnik Opht., 1934, v. 4, pt. 4, p. 398.

Concave lenses were placed before the eyes of young students focusing for distance, with convergence completely relaxed. Because they could overcome from 0.5 to 9 diopters of concave lens the author concludes that accommodation is independent of convergence and that the conception of relative accommodation is erroneous. If this be true, the author considers prescription of a full myopic correction for close work illogical, and thinks errors of refraction have no etiologic significance in strabismus. Ray K. Daily.

Marlow, F. W. **The symptoms of hidden ocular muscle imbalance.** New England Jour. of Med., 1934, v. 210, Feb., p. 309.

Headache and other asthenopic symptoms require the consideration of three factors, namely, refraction, muscle balance, and general health. Marlow discusses conditions found in one hundred cases in which symptoms were not relieved by repeated attempts at correction of refraction, manifest muscle balance, and general conditions. The muscle balance was then studied by prolonging the cover test for a week or longer. Case reports show marked differences between muscle imbalances as demonstrated by the conventional methods and by the prolonged occlusion test. Striking relief from symptoms fol-

lowed correction of muscle imbalances shown by the occlusion test.

John C. Long.

Stokes, W. H. **Paralysis of divergence.** Arch. of Ophth., 1934, v. 11, April, pp. 651-664.

The author thoroughly discusses this condition and reports five cases. He believes that this anomaly is not so rare as the number of reported cases would indicate. In the first two cases the patients were sisters aged sixty-eight and seventy-one years respectively. Diplopia, which had been present two months and three years respectively, was relieved in each instance by prisms incorporated in the distance correction only. The third patient was a man aged sixty-three years, who had worn prisms for twenty-five years for relief of this condition. In case four, aged seven years, the paralysis occurred during an attack of encephalitis and disappeared in about three months. In case five the paralysis was complicated by convergence excess. In these cases prisms do not give relief and resection or advancement of the external recti should be done.

J. Hewitt Judd.

5. CONJUNCTIVA

Chopra, R. N. **Conjunctivitis produced by a ground beetle.** Indian Med. Gaz., 1934, v. 69, Jan., p. 23.

In Calcutta the author was bitten on the conjunctiva by a beetle belonging to the genus Clivina. The bite was followed by severe conjunctivitis lasting five days. A brief discussion of beetles belonging to the family Carabidae is given. John C. Long.

Dedimos. **The pathogenesis and treatment of vernal catarrh.** Arch. d'Opht., 1934, v. 51, May, p. 277.

Seven cures, five ameliorations, and three disappointments were obtained in treatment of fifteen individuals with vernal catarrh by subconjunctival injection of adrenalin as introduced by Tessier. A 1 to 2000 solution with an initial dose of 0.2 c.c. increased progressively to 0.5 c.c. was injected as close to the lesion as possible. A series of from twelve to fifteen doses were given at two-day intervals. The bulbar type showed the most favorable results, but even some of the palpebral type with granulations improved after a second course of treatment fifteen days after the first course. The permanence of the cure has been followed only for the one season under treatment. It is concluded that vernal catarrh arises from irritation by sunlight in individuals of vagotonic nature or with disturbances of the sympathetic nervous system. The effect of the adrenalin as injected at the site of the lesion is both local and general, for no other site of administration will produce favorable results. M. F. Weymann.

Edeskuty, Otto. **A pterygium operation which prevents recurrence.** Zeit. f. Augenh., 1934, v. 83, April, p. 109.

The pathological tissue in a pterygium is the subconjunctival proliferated connective tissue. If this is dissected out from the limbus to the region overlying the rectus muscle there will be no recurrence no matter what other parts of the pterygium are left. The author abscinds the pterygium from the cornea, makes a short incision at the limbus (2 mm. down from the horizontal meridian), and then from each end of this incision makes a 12 mm. horizontal incision. He carefully dissects all connective tissue from the posterior surface of this rectangular flap and also from the underlying episclera. The flap is replaced and secured with two sutures above and below. F. H. Haessler.

Falta, M. **Unity in the several questions of trachoma.** Rev. Internat. du Trachome, 1934, v. 11, April, p. 92.

Falta criticizes the term "acute trachoma" and states that the disease is always chronic, the acute phases being due to superimposed bacterial infection. He suggests that trachoma follicles be called granules to distinguish them from the histologically different follicles of lymphoid nature. The term "pannus" he would replace by "venous cataract." Phillips Thygeson.

Farrell, J. I. **Gonorrheal ophthalmia.** Amer. Jour. Ophth., 1934, v. 17, July, pp. 591-597.

Fodor, G., and Vlastis, L. **The bacterial flora of the normal and inflamed conjunctiva.** Klin. M. f. Augenh., 1934, v. 92, May, pp. 643-649.

The authors take secretion from the regions of the fornix and caruncle with a platinum loop, or lightly scrape up some epithelium. A simple smear from this material is stained with Gram's stain. The authors do not believe a common organism to be the cause of a conjunctival inflammation unless it predominates in the smear.

They conclude that staphylococcus and streptococcus cause no conjunctival inflammation. On the normal conjunctiva in some acute conjunctivitides, and in panophthalmitis after ulcus serpens and postoperative infection, pneumococcus of group 4 is found. This is a saprophyte for conjunctival as well as corneal epithelium. Only those conjunctivitides should be diagnosed as pneumococcic which have a characteristic course and heal critically, and in which pneumococcus is found massively in almost pure culture. Usually the pneumococci that do this are in group 1 or 2. F. H. Haessler.

François, Jules. **Catamenial conjunctivitis: ocular affections following the occurrence of normal menstruation.** Arch. d'Opht., 1934, v. 51, May, p. 286.

A woman of twenty-three years was reported as having hyperemia of the left conjunctiva which appeared eight days before each menstrual period and lasted exactly two days. This had occurred without exception for seven and one-half years. Menstruation had begun at the age of fifteen and one-half years. Treatment was of no avail until autohemotherapy reduced the duration of the attacks and the time of appearance before menstruation from eight to two days. Finally administration of female sex hormone cured the condition completely. A review of the literature concerning ocular complications associated with normal menstruation is given. M. F. Weymann.

Grolman, G. **International prophylaxis of trachoma in the Republic of Argentina.** Arch. de Oft. de Buenos Aires, 1933, v. 8, Dec., pp. 601-604.

This is a short report as to prophylaxis of trachoma in immigrants to the Republic of Argentina. Trachoma patients are forbidden to enter the country. The author requests the government to prohibit entrance into the country of any persons having even the slightest symptoms of trachoma.

R. Castroviejo.

Harner, C. E. **Parinaud's conjunctivitis.** Amer. Jour. Ophth., 1934, v. 17, July, pp. 629-631.

Hoorens, J. **Jequiritol, a remedy too seldom used.** Bull. Soc. Belge d'Opht., 1933, no. 67, p. 65.

Jequiritol, introduced into ocular therapy by Römer, should not be confused with the jequirity maceration of De Wecker, the action of which is uncertain and often too violent. The writer advocates the use of jequiritol not only in cicatricial trachoma complicated by pannus, but in relatively recent cases of trachoma, and above all in those presenting symptoms that resemble phlyctenular conjunctivitis.

J. B. Thomas.

Lazarev, E. **A new technique of corneal transplantation.** Sovietskii Viestnik Opht., 1934, v. 4, pt. 4, p. 337.

The author devised a steel plate which, fixed on the cornea, permits accurate excision with a knife of a ribbon-like transplant, consisting centrally of the entire corneal thickness and peripherally of the superficial portion of the cornea and adjacent conjunctiva. A flap is cut in this fashion from the opaque and transparent corneas. The transplant thus fits perfectly on its bed, and is fastened by conjunctival sutures.

Ray K. Daily.

Motais, F. **The favorable effects of tarsectomy by the cutaneous method on trachoma with or without entropion.** Rev. Internat. du Trachome, 1934, v. 11, April, p. 65.

Since 1928 Motais has respected the tarsal conjunctiva and has employed

only tarsectomy by cutaneous approach. The operation, which he describes in detail, not only corrects entropion and trichiasis but appears to have a quieting influence on the main disease, probably because of suppression of the infected tarsal glands. The author now recommends this procedure for all cases of cicatricial or granulocicatricial trachoma with thickened tarsus and irritative symptoms, irrespective of the state of the cornea.

Phillips Thygeson.

Plumer, J. S. **Purulent conjunctivitis in infants.** Pennsylvania Med. Jour., 1933, v. 36, Aug., p. 821.

The author points out that staphylococcus aureus may cause in a newborn a conjunctivitis which clinically resembles a gonococcal infection. In the young the conjunctiva is more susceptible to the staphylococcus than in adults. Gram's method cannot always be relied upon. (Discussion.)

M. E. Marcove.

Puscariu, E. **Unilateral trachoma. Unilateral gonococcic conjunctivitis.** Rev. Internat. du Trachome, 1934, v. 11, April, p. 108.

Puscariu found fifteen cases of unilateral trachoma in 1,073 cases of the disease, an incidence of 1.39 percent. In all fifteen cases the disease was advanced, with pannus and often corneal ulceration. The author does not believe that the unilaterality is only apparent, as have claimed Wickerkiewicz, Küsel, and Cattaneo, but gives as explanation the fact that the conjunctiva is resistant to infection unless irritated by scarifications and other irritations. This resistance, she states, explains why people may remain for many years unaffected in the midst of a heavily infected population.

Forty-two cases of unilateral gonococcic conjunctivitis were found in a total of 192, or 21.87 percent. The author states that the normal conjunctiva has a high resistance to the gonococcus, a fact which explains the low incidence of ocular as compared to genital infection. Phillips Thygeson.

Renedo, J. M., and Gonzalvez, F. R. **Hard chancre of bulbar conjunctiva.** Arch. de Oft. Hisp.-Amer., 1934, v. 34, May, p. 249. (See Amer. Jour. Ophth., 1934, v. 17, June, p. 562.)

Rostkowski, L. **The lid everter in the treatment of trachoma.** Rev. Internat. du Trachome, 1934, v. 11, April, p. 114.

Rostkowski describes a lid everter designed by him for use in the surgical treatment of trachoma. After cocaine anesthesia the lid is everted and a glass rod used to express the follicles. The lid everter serves to give solid support against which pressure may be applied. The method is equally useful for the lower lid. Phillips Thygeson.

Selfa, E. **Copper citrate in the therapy of trachoma.** Rev. Internat. du Trachome, 1934, v. 11, April, p. 84. (See Amer. Jour. Ophth., 1934, v. 17, June, p. 563.)

Smith, R. C., Myers, E. A., and Lamb, H. D. **Ocular and oral pemphigus.** Arch. of Ophth., 1934, v. 11, April, pp. 635-640.

A white woman aged sixty-one years presented typical oral lesions of thirteen months' duration, associated with vesicles on the right eyelids and cheek. In the right eye there was a central corneal ulcer and the conjunctiva was extremely scarred and contracted, causing limitation of ocular movements and distortion of the eyelids. Vision was reduced to light perception. The left eye had normal vision and presented only shrinkage of the conjunctiva in the lower fornix. The right globe was removed for the relief of pain. Histologic examination showed ocular pemphigus to be essentially a chronic inflammatory process in the conjunctiva with the formation of new connective tissue and subsequent contraction of the membrane. The other changes in the eyeball are secondary.

J. Hewitt Judd.

6. CORNEA AND SCLERA

Dean, F. W. **Treatment of Mooren's ulcer.** Arch. of Ophth., 1934, v. 11, May, pp. 832-835.

This case was reported in the Surgical Journal in 1922. A man aged seventy years presented typical Mooren's ulcer at the inner and outer limbus of the right eye. Various cauterizing agents were of no avail and the eye was removed. Two weeks later the remaining eye developed a similar ulcer. Because of the pathology found in the conjunctiva of the first eye, all the inflamed tissue from the thickened area near the limbus was removed, the area cauterized, and a sliding conjunctival flap drawn over this area. Healing was rapid and uneventful and there was no recurrence during a number of years before the patient died. (Photographs, photomicrograph, drawing.)

J. Hewitt Judd.

Dvorschetz, M. **Remarks on the pathogenesis of ocular complications of grippe.** Sovietskii Viestnik Opht., 1934, v. 4, pt. 4, p. 395.

In a former communication (see American Journal of Ophthalmology, 1934, volume 17, page 678) the author pointed out that epidemics of grippe differ in their ocular complications. The principal ocular complication of the epidemic of grippe in 1931 and 1932 was a keratitis, phlyctenular or parenchymatous clinically. The phlyctenular keratitis occurred in adults from twenty to sixty years of age, was frequently severe and prolonged in its course, and clinically was indistinguishable from the phlyctenular keratitis of children. The parenchymatous keratitis was always unilateral, and its course was shorter and milder than that of syphilitic or tuberculous keratitis. The author believes that the virus of influenza is the direct cause of these affections.

Ray K. Daily.

Gradle, H., and Gifford, S. R. **Delimiting keratotomy.** Trans. Amer. Acad. of Ophth. and Otolaryng., 1933, 38th annual meeting, pp. 120-130; also Amer. Jour. Ophth., 1934, v. 17, July, p. 602.

Hilgarten, H. L., and Hilgarten, H. L., Jr. **Radium in lesions of the cornea.** Arch. of Physical Therapy, X-ray, Radium, 1934, v. 15, Feb., p. 103.

The application of radium to the eye for short periods is of definite value in trachoma, corneal opacities, leucoma and postoperative recurrent pterygia. A case of advanced trachoma with pannus was definitely improved by radium therapy. Small exposures of radium inhibit the development of corneal scars. Leucomas of the cornea were treated by excision of the scar tissue followed by repeated exposure to 10 mg. of radium for from three to five minutes. Two cases are reported in which the result was excellent. The use of radium in recurrent postoperative pterygium is very satisfactory. Radium applied after pterygium operations results in a more rapid and complete clearing of the cornea and prevents recurrence of the growth. Cataract was not observed in any of the cases treated.

John C. Long.

Klauber, E. **A new method of treating corneal ulcers.** Ann. d'Ocul., 1934, v. 171, May, pp. 424-428.

The method consists of surrounding or limiting severe advancing ulcers by an area of tattooing with gold chloride and tannic acid.

H. Rommel Hildreth.

Morse, A. W. **Electrocautery in treatment of corneal ulcers.** Pacific Coast Oto-Ophth. Soc., 1933, 21st annual meeting, June 28, pp. 16-18; also Amer. Jour. Ophth., 1934, v. 17, July, p. 608.

Olah, Daniel. **A new species of periconia; periconia keratitidis.** Klin. M. f. Augenh., 1934, v. 92, May, pp. 650-652.

A culture which had been made from an eye with keratitis was given to the author for botanical identification. The fungus was a periconia but differed in some characteristics from other periconidia. Cultures inoculated into rabbit eyes produced keratitis and from the lesion the fungus could again be isolated. The author suggests the name periconia keratitidis. F. H. Haessler.

Russo, Antonio. **Argyrosis of the cornea (biomicroscopic study).** Ann. di Ottal., 1934, v. 62, May, p. 337.

Argyrosis of the cornea may be endogenous or exogenous. Its commonest

origin is from continued application of silver salts to the eyes. Slitlamp examination of three cases reported showed an elective predilection for deposit granules in the membrane of Descemet. In one case Bowman's membrane was also thickly dotted with minute particles. The author believes that in one case the penetration was not only through the rete lymphatica perilimbica but also directly through the modified corneal epithelium. (Bibliography, one plate.) Park Lewis.

Van der Straeten. **Blue sclerotics.** Bull. Soc. Belge d'Opht., 1933, no. 67, p. 114.

The author reports two cases of this syndrome of blue sclerotics, fragility of bones, and occasionally progressive deafness. The first patient, a girl of nine years, gave no family history of similar defects. In the second patient, a man of thirty-one years, the author was able to make a precise study of three generations which included numerous examples of the syndrome.

J. B. Thomas.

7. UVEAL TRACT, SYMPATHETIC DISEASE, AND AQUEOUS HUMOR

Badot, J. **Communication concerning sympathetic ophthalmia.** Bull. Soc. Belge d'Opht., 1933, no. 67, p. 43.

This report is based on histological study of a blind eye that had been injured three years previously and had been enucleated on appearance of symptoms of sympathetic ophthalmia in the other eye. There was well-marked lymphocytic choroiditis. The writer concludes that if one considers the three different theories of sympathetic ophthalmia, (a) the metastatic, (b) the migratory, and (c) the combined, his case favors the migratory theory, which explains the development of the disease by transportation of the infection along the sheaths of the optic nerves and chiasm. In discussion Vandermeulen reported a case in which cure was obtained without removal of the sympathizing eye, by prolonged treatment with extract of tubercle antigen (Pasteur). But Van Lint regarded the rôle of tuberculosis in sympathetic ophthalmia as far from established. J. B. Thomas.

Bracci-Torsi, H. **On the immunization reactions of the aqueous humor and its fractional proteins in normal eyes.** Ann. di Ottal., 1934, v. 62, May, p. 383.

The antibodies that are found in the fluids of the eye are agglutinin, precipitin, bacteriolysin, hemolysin, and opsonin. Methods are detailed by which the fractions are separated from the aqueous. Experiments as to their immunizing properties and as to their anaphylactic reactions were made on a number of animals. The author's conclusions are in accord with those of others published, the special technique not affecting the general results. (Bibliography.) Park Lewis.

Fuchs, A. **Surgical treatment for iridocyclitis.** Arch. of Ophth., 1934, v. 11, April, pp. 591-603.

For cases of chronic iridocyclitis with increased tension, iridectomy is advised if the posterior adhesion has not become complete. When seclusion of the pupil and iris bombé are present either transfixion or partial transfixion with immediate iridectomy is used. A method of iridectomia ab externo is described and recommended as less dangerous or painful, especially for cases of severe acute glaucoma. Repeated punctures of the anterior chamber are advocated for serous iritis and for iritis in diabetics after cataract operation. To improve vision, if the pupil is small, an optical iridectomy done above gives a sufficiently large opening and provides a convenient coloboma if extraction becomes necessary. Preliminary iridectomy and extracapsular extraction are advised in complicated cataracts. Discission is done with two needles. Aspiration of vitreous according to the technique of zur Nedden usually gives only temporary improvement. (Drawings.) J. Hewitt Judd.

Hubert, J. **Some cases of heterochromia of Fuchs.** Bull. Soc. Belge d'Opht., 1934, no. 67, p. 87.

The writer presents a clinical study and report on three cases, with a résumé of the characteristics of the condition according to Fuchs. (Nineteen references.) J. B. Thomas.

Krasso, Ilona. **Evaluation of the histologic findings in the secondarily involved eye in sympathetic ophthalmia.** Zeit. f. Augenh., 1934, v. 83, April, p. 77.

No complicating surgical operation had been performed on the eye. In the iris and ciliary body the inflammation was plastic and exudative, in the choroid infiltrative. Since Meller has demonstrated the presence of tubercle bacilli in an eye afflicted with sympathetic ophthalmia, many of the discussions which abound in the literature have become superfluous. Tubercle bacilli produce any type of lesion from acute exudative to smoldering infiltrative. F. H. Haessler.

Mettey and Redslob. **Transudative pigmentary chorioretinitis.** Ann. d'Ocul., 1934, v. 171, May, pp. 396-405.

In 1924 a young adult female had had failing vision in the left eye for six months. The history was negative, and complete physical and laboratory studies revealed no cause. The macular region of the left eye was raised, yellow-gray in color, and occupied an area 2 d.d. in size. The disc gradually became moderately swollen but there was no great change during two years. The patient then disappeared to return in 1930, four years later, when vision was down to light perception. The tension was normal, but the swelling suggested neoplasm so an enucleation was performed.

Microscopically the retinal elements had degenerated, the choroidal vessels were dilated and thickened, and patches of scar tissue barraged one of the venae vorticosae, this accounting for the edema and the fluid separating the retina, which was a transudate and not secondary to inflammation.

H. Rommel Hildreth.

Morax, Truche, and Nida. **Ocular disorders in the paralysis of fowl (pheasant type).** Ann. d'Ocul., 1934, v. 171, May, pp. 385-396.

In 1907 a paralysis in fowl was recognized that could be distinguished from beri-beri although the lesion was shown to be in the peripheral nerves. The cause is supposed to be a filterable virus. The characteristic iridocyclitis may be recognized by irregularity of the pupil and macroscopic pigmentation of the iris. The microscopic findings are those of chronic inflammation. Secondary changes may include degeneration of the lens and a corneal edema that resembles early interstitial keratitis. The choroid and retina are not involved. H. Rommel Hildreth.

8. GLAUCOMA AND OCULAR TENSION

Gifford, S. R. **Iridencleisis in buphthalmos.** Arch. of Ophth., 1934, v. 11, May, pp. 751-756.

The previously reported results of operations for buphthalmos are summarized. The author concluded that while trephining had given many good results it was more liable to certain serious complications in buphthalmos than in chronic simple glaucoma. He therefore tried iridencleisis, with success. He now reports three more cases (five eyes) in which this operation was used, with complete success in three eyes. In the fourth eye a second iridencleisis gave normal tension but the elapsed period of time is too short to be certain of the result. In the fifth eye normal tension was maintained but the vision failed after two years. The absence of complications serves to recommend iridencleisis. The author describes his modifications of Holth's technique. (Photograph, drawings.)

J. Hewitt Judd.

Lloyd, R. I. **The scotoma of glaucoma simplex.** Amer. Jour. Ophth., 1934, v. 17, July, pp. 579-590.

Raymond, R. L. **Increased intraocular tension in young persons as a cause of severe frontal headaches.** Brit. Med. Jour., 1934, Jan. 20, p. 102.

Four cases of severe frontal headache due to increased intraocular pres-

sure are reported in men of ages varying from twenty-five to thirty years. Increased tension was determined by digital palpation. Symptoms were increased by pressure on the globe and were relieved by the use of eserin. Cupping of the discs was noted in only one case. Recurrence was not observed nor was vision affected.

John C. Long.

Uudelt, J. **The rôle of the iris and its pupillary movements in the genesis of glaucoma.** Klin. M. f. Augenh., 1934, v. 92, May, pp. 619-628.

On the basis of his own slitlamp studies and the writings of others the author emphasizes the importance of the iris in glaucoma. In glaucomatous eyes it is always atrophic, probably less able to absorb intraocular fluids. The author regards this as cause rather than an effect of glaucoma. In the course of time the iris becomes stiff, the play of the pupil decreases, and the suction-pump action necessary for adequate fluid exchange ceases. This explains why a stay in the dark may precipitate an attack of glaucoma.

F. H. Haessler.

9. CRYSTALLINE LENS

Cerchez, V. **Postoperative plastic iritis in senile cataract. Means of avoiding this complication.** Ann. d'Ocul., 1934, v. 171, May, pp. 406-421.

The author believes the commonest cause to be irritation from remaining lens substance. Plastic iritis is practically unknown after intracapsular extraction. H. Rommel Hildreth.

Connell, H. C. **A discussion of the factors concerned in intraocular absorption.** Canadian Med. Assoc. Jour., 1934, v. 30, Feb., p. 124.

Small cubes of lens material were suspended in buffered solutions adjusted to various hydrogen-ion concentrations. To these solutions were added preparations of leucoprotease, lymphoprotease, and globuloprotease. After an incubation period nitrogen determinations by the Kjeldhal method were done on the digestion mixtures. This gave an estimate of the amount of digestion of the lens material. The optimum pH was found to be 7.2 for leucoprotease, 6.4 for lymphoprotease, and 6.6 for globuloprotease. Serum albumin inhibited the action of all of these enzymes. In the aqueous of young and adult rabbits is an enzyme whose concentration is higher in young animals than in old. In the young the pH of the aqueous is optimal for leucoprotease. These experimental results agree well with clinical observations on the intraocular absorption of lens material.

John C. Long.

François, Jules. **Opacity of the lens sutures.** Bull. Soc. Belge d'Opht., 1933, no. 67, p. 12.

The author reports a case of lenticular opacity in which congenital opacities were associated with those occurring after birth and in which opacity of the embryonic sutures coexisted with that of the adult sutures. The biomicroscopic characters of the case have received particular attention and the report is illustrated by eight drawings. The study is said to demonstrate once more the fact that between the different forms of opacity of the lens, whether congenital or acquired, there is only a difference of localization and of age of appearance and not a difference in the nature of the opacity. J. B. Thomas.

Hambresin, L. **The three great accidents in total extraction of cataract with forceps.** Bull. Soc. Belge d'Opht., 1933, no. 67, p. 46.

Loss of vitreous, iris prolapse, and vitreous opacity following the operation are given as the three serious accidents of intracapsular cataract extraction with forceps. Hambresin advises tonometry before operation, and favors palpebral akinesis and preliminary conjunctival suture. To avoid iris prolapse he maintains that peripheral iridectomy, or even partial iridectomy of the sphincter, is not effective, and he favors a wide iridectomy. Inclusion of zonular fibers in the wound and consequent later upward displacement of the pupil may be avoided by delivering the lower border of the lens first.

Vitreous opacities following the operation are not of inflammatory origin but are due as a rule to hemorrhages, which often first appear several days after the operation and are very slowly absorbed. To avoid these one must determine the blood pressure before operating. The operation must be performed with great delicacy and with slight lateral movements. The author is convinced that either retrobulbar or subconjunctival injection of adrenalin favors retinal hemorrhage.

J. B. Thomas.

Herrenschwand, F. V. **Reopening of wound after cataract extraction and its prevention by means of conjunctival flap.** Zeit. f. Augenh., 1934, v. 83, April, p. 87.

In mountainous regions of Austria and Germany reopening of the wound after cataract operation is strikingly common. The author encountered it in sixteen percent of his private patients. The urban population, no less than the rural, seems unable to avoid associating even the acts of sneezing and coughing with great bodily exertion. Tiny resulting hemorrhages and increased intraocular pressure are the immediate causes of reopening of the wound. Since using a conjunctival flap prepared according to the technique published by Birch-Hirschfeld, the author has had no more trouble of this kind. He does not open the eyeball until all bleeding from the preliminary flap has stopped.

F. H. Haessler.

Little, M. F. **Treatment of unilateral cataract with contact glasses.** Arch. of Ophth., 1934, v. 11, April, pp. 646-650.

The author briefly reviews the history and uses of contact glasses. He reports the case of a boy aged seventeen years who developed exotropia of 55 degrees after removal of unilateral cataract. Single binocular vision was obtained with a contact glass on this eye and a base-in prism. The strength of the prism was gradually reduced over a period of three months until single binocular vision and orthophoria were obtained by use of the contact glass alone. When the contact glass was left off for six weeks an exotropia of 20 degrees appeared, but this was corrected again by wearing the contact glass.

J. Hewitt Judd.

Nordmann, Jean. **The present known facts concerning the problem of cataract.** Arch. d'Opht., 1934, v. 51, May, p. 297.

The conclusion of this résumé of the literature concerning the problem of cataract covers work done upon physiochemical lines and a discussion of the mechanism and pathogenesis of cataract, using the facts previously cited. Various medical treatments, including iodides, lens antigen, and hormones, are not proved to have any value. The ultimate conclusion of the writer after a survey of the voluminous literature is that our knowledge of the normal and cataractous lens is as yet very restricted.

M. F. Weymann.

Row, H. **Adjustable control stop to limit opening of intracapsular cataract forceps.** Arch. of Ophth., 1934, v. 11, May, pp. 836-837.

An adjustable stop fitted to the Safar forceps allows any amount of opening up to 7 mm. The opening is controlled by a clamp which is held firmly in position by a lock nut. A similar stop can be fitted to any type of forceps.

J. Hewitt Judd.

Wagner, H. **Body temperature of glass-makers in Bulach.** Klin. M. f. Augenh., 1934, v. 92, May, pp. 641-643.

It has been suggested that a factor in the genesis of glass-blowers' cataract is increased body temperature. The author systematically measured the temperature of workers, and found that a rise in temperature of less than 0.5 degree centigrade occurred.

F. H. Haessler.

10. RETINA AND VITREOUS

Campos, R. **Sealing of the retina by multiple diathermic puncture after the method of Safar (histologic research).** Ann. di Ottal., 1934, v. 62, May, p. 360.

The author discusses the various methods and concludes from experi-

mental research on rabbits that the procedure advocated by Safar is followed by the most satisfactory results. Sections of the tissue were examined at intervals of 1, 3, 6, 10, 20, 40, and 60 days. Observations were made on the changes present in the sclera, the extent and the rapidity of repair of the lesion, the effect produced in the episcleral connective tissue and in the choroid, and in the retina the variable degrees of extension of the degenerated area around the puncture. The author finds that diathermal puncture excites a reaction much less intense than that from the Weve surface treatment and produces an adhesion no less firm. (Bibliography, twelve plates.)

Park Lewis.

Cannady, E. W., and O'Hare, J. P. **A critical survey of the retinal lesions in chronic glomerular nephritis.** Jour. Amer. Med. Assoc., 1934, v. 103, July 7, p. 6.

Thirty-two cases of chronic glomerular nephritis were followed over periods of from six months to almost fourteen years. In thirty of the cases, retinal changes developed before death. Twenty-five showed advanced arteriosclerotic retinopathy or hypertensive neuroretinopathy. Elevation in blood pressure preceded the appearance of retinal arteriolar sclerosis in thirteen out of seventeen cases. Hypertension was present in every patient who had an advanced retinopathy. The blood pressure was low in the only two cases without vascular or other retinal changes. Ophthalmoscopic differentiation between the lesions of chronic glomerular nephritis and of primary vascular hypertension was impossible in most cases. The occurrence of the two types of advanced retinopathy in the same patient at different times suggests that they are merely variants or different stages of the same pathologic process. Every patient in the group, including even those with no retinal changes, developed marked nitrogen retention and died in uremia. The average duration of life after the appearance of either arteriosclerotic retinopathy or hypertensive neuroretinopathy was less than seven months; the maximum twenty-three months.

George H. Stine.

Coppez, Léon. **Experimental choroiditis induced with the aid of the pyrometric electrode.** Bull. Soc. Belge d'Opht., 1933, no. 67, p. 54.

Three scleral diathermy coagulations were applied respectively at 70, 80 and 90 degrees during enucleation of a human eye for sarcoma of the ciliary body. The three areas were studied histologically. The choroid was slightly congested by 70 degrees, more by 80 degrees, and from 90 degrees up showed coagulation of the vessel walls. The same gradation of effects was noted in the retina, the tissues after 80 and 90 degrees showing some edema, degenerating into a clear dissociation of elements on the borders of the zones treated. The effect of thermo-coagulation is more intense at the borders of areas thus treated, which agrees with the fact that the diathermic flux is always more concentrated at the border of the electrode than at its center. Thus control of temperature is absolutely necessary in performing surface coagulations. (Six photomicrographs.)

J. B. Thomas.

Danis, M. **Traumatic retinal angiopathy.** Bull. Soc. Belge d'Opht., 1933, no. 67, p. 32.

In 1910 Pürtscher described, under the name of traumatic retinal angiopathy, a morbid entity which may follow a violent blow on, or sudden compression of, the head. The author reports a case of Pürtscher's disease, illustrated by four photographs of the eyegrounds. With the ophthalmoscope one sees round, white, cloudy areas, sometimes confluent, perhaps covering the vessels, or following the direction of the optic nerve fibers in the internal layers of the retina. This appearance resembles that of pernicious anemia but may be differentiated by analysis of the blood.

J. B. Thomas.

Edgerton, A. E. **Ocular observations and studies of the new-born.** Arch. of Ophth., 1934, v. 11, May, pp. 838-867.

The author reviews the literature and summarizes the reports under causes of intracranial hemorrhage, causes of retinal hemorrhage, and severe eye injuries noted in the literature. His studies were based on examination of 458 infants. He found retinal hemorrhage in forty-one percent but macular hemorrhage only four times. He believes that the main factor in retinal hemorrhage is probably congestion of the retinal veins due to increased intracranial pressure and a combination of circumstances governing labor. Abnormalities of labor do not cause an increased tendency to hemorrhage except in high forceps deliveries. Fifty percent of premature and ninety percent of immature babies had retinal hemorrhage. (Tables, complete bibliography.)

J. Hewitt Judd.

Fischer, Franz. **Anatomical findings after diathermal puncture of the eyeball in retinal detachment.** Zeit. f. Augenh., 1934, v. 83, April, p. 95.

Two patients who had been operated on by the Safar method died on the eighth and fourteenth days after operation, respectively. In each case penetrating wounds were found in the sclera as well as superficial defects. The canals were filled with granulation tissue which arose in the greatly inflamed scleral tissue. In some instances the canal traversed the choroid as well. The scleral change did not extend beyond a diameter of 0.5 mm. except in areas where multiple punctures were near together. Here the areas of reaction were confluent. There was extensive hemorrhage into the subchoroidal space. In the first eye the picture was complicated by a massive hemorrhage which infiltrated the choroid and separated it from the sclera in the area of operation. In the second eye extensive changes in choroid, pigment epithelium, and retina were limited to the areas of diathermal necrosis in the sclera. The tissues were densely infiltrated with round cells and were firmly adherent to the sclera at the site of each puncture hole. The retina is not always injured in these areas, although some portions of the retina are severely injured.

F. H. Haessler.

Foxonet, Jean. **The importance of obliteration of the tear in detachment of the retina.** Ann. d'Ocul., 1934, v. 171, May, pp. 422-424.

Retinal detachment was cured by operation. The article is to acknowledge the importance of closing the retinal tear. H. Rommel Hildreth.

Fritz, M. **The ratio of brachial and retinal blood pressures.** Bull. Soc. Belge d'Opht., 1933, no. 67, p. 67.

After study of fifty subjects either normal or affected solely with compensated hypertension, Fritz reaches the following conclusions: (1) The relation between comparable elements of brachial and retinal blood pressures should not be defined in the form of a fraction as is customary, but by the difference between the pressures. (2) The maximum and minimum brachial pressures exceed by about an equal amount the similar retinal pressures. (3) The difference in pressure between the brachial and retinal arteries, equal on the average to 55 mm. of mercury, may be found much increased or diminished (95 to 15). (4) It is independent of the arterial pressure and of the viscosity of the blood. (5) It seems to be linked with the anatomic and vasomotor resistance opposed by the cephalic arterial trunks. (Seven references.) J. B. Thomas.

Henderson, R. H. **Retinitis punctata albescens and retinitis pigmentosa as affected by pregnancy.** Arch. of Ophth., 1934, v. 11, May, pp. 763-768.

A girl aged seventeen years presented typical retinitis pigmentosa associated with retinitis punctata albescens and a ring scotoma in each eye. Three months later there was apparent retrogression of the retinal disease as evidenced by disappearance of the scotoma and improvement in the hemeralopia. About three years later pregnancy apparently caused an exacerbation as shown by marked narrowing of the fields, increase

in the hemeralopia, and increase in the amount of pigment. Pregnancy was interrupted in the eighth month and the contraction of the fields was arrested, but there has been an increase in the deposit of pigment. (Fields.)
J. Hewitt Judd.

Jacoby, M. W. **Pseudoxanthoma elasticum and angioid streaks.** Arch. of Ophth., 1934, v. 11, May, pp. 828-831.

Each eye of a woman aged twenty-seven years showed postchoroiditic lesions and angioid streaks radiating outward from the disc. Typical skin lesions were present in the neck and axillae. There was a history of trauma to the left eye and of several intercurrent infections, and the author believes these to have been exciting or hastening factors. Fundus photographs would seem to establish that the streaks are due to veins which have undergone modification in an altered collateral circulation. J. Hewitt Judd.

Kirwan, E. O'G. **The etiology and treatment of retinal detachment.** Indian Med. Gaz., 1934, v. 69, Jan., p. 4.

Types of retinal tear are described, and the technique and advantages and disadvantages of the Gonin, Guist, Larsson, Weve, and Safar methods of treatment are considered. Electrocoagulation by diathermy is considered the method of choice. John C. Long.

Leinfelder, P. J., and Salit, P. W. **The lipids of retina, brain, and blood.** Amer. Jour. Ophth., 1934, v. 17, July, pp. 619-624.

Mitter, S. N. **A case of bilateral macular disease in a child.** Indian Med. Gaz., 1934, v. 69, Jan., p. 24.

Mitter describes a case of bilateral macular edema with marked loss of vision in a boy aged nine years. Under atropin, dionin, iodides, salicylates, Sajodin, and thyroid, improvement was rapid and nearly complete. The only other positive physical finding in this case was ichthyosis, which had been present in the family for three generations and had not been previously associated with ocular disease. The author suggests that the ocular condition may have been due to metabolic toxins, possibly on the basis of thyroid insufficiency. John C. Long.

Moulie, H. B. **Treatment of retinal detachment by Gonin's ignipuncture. Report of cases.** Arch. de Oft. de Buenos Aires, 1934, v. 9, Jan., pp. 17-35.

Four cases were successfully so treated. Complete reattachment of the retina in the four cases was maintained for a period of time varying between seven and thirty months after the operation. Vision improved in every case. Immobility of the eyes was maintained from five to seven days after the operation by a retrobulbar injection of 5 c.c. of blood obtained from an arm vein of the patient. The author states that in a retinal detachment with single retinal tear Gonin's ignipuncture is to be preferred to the more recent methods of chemical cauterization and electrocoagulation. R. Castroviejo.

Opadovskaia, E., Prschibilskaia, I., and Skorodinskaia, B. **The etiology and prophylaxis of retinal detachment.** Sovietskii Viestnik Opht., 1934, v. 4, pt. 4, p. 388.

During the last twenty-seven years the Odessa Eye Clinic had 251 cases of retinal detachment. Twelve percent of the cases were bilateral, and 173 eyes were myopic. Trauma was an important factor, but more so in the nonmyopic cases. The greatest number of cases were between the ages of twenty-five and forty-five years, and the number was equally divided between men and women. The author urges medical supervision of myopic children during school age and careful vocational guidance which would lead them into work free of eye strain and traumatic hazards. Ray K. Daily.

Vogt, A. **Free-floating plug from retinal hole, a form of vitreous opacity, with observations on latent foramina retinae.** Klin. M.f. Augenh., 1934, v. 92, May, pp. 577-584.

Not every hole or rent in the sclera need be followed by retinal detachment. A very long latent period is occasionally observed. In one instance Vogt ob-

served the round white cover for such a hole suspended in the vitreous, where it remained unchanged for months.
F. H. Haessler.

Weekers, L. **Paralyzing injections in the operative treatment of retinal detachment.** Bull. Soc. Belge d'Opht., 1933, no. 67, p. 52.

Immediately after operating for detachment of the retina it is customary to seek immobility of the eyeball by keeping the patient in bed and immobilizing the head as much as possible from one to two weeks or even more. During convalescence the use of Lindner's stenopaic glasses has proved very useful. Weekers is accustomed to paralyze the ocular recti muscles by injecting 0.5 c.c. of the following solution before operation, to a depth of about 2 cm., in the region of each of the four recti: aqueous solution of mercury oxycyanide 1 to 250, and alcohol 80 percent, equal parts. The paralysis lasts from several days to several weeks. In addition to immobilizing the globe these injections have another very useful curative effect, in that they cause adhesive choroiditis and thus increase the effect of the operation. It is important not to use a stronger solution than that indicated. J. B. Thomas.

Weiss, H., and Evans, J. N. **Experimental production of detachment of the retina.** Amer. Jour. Ophth., 1934, v. 17, July, pp. 627-628.

11. OPTIC NERVE AND TOXIC AMBLYOPIAS

Gritti, P. **Retrobulbar optic neuritis from frontal sinusitis.** Riv. Oto-Neuro-Oft., 1934, v. 11, March-April, pp. 129-134.

The author infected the frontal sinuses of dogs with the streptococcus and the typhoid bacillus. On microscopic examination the corresponding optic nerves showed cellular infiltration around the blood vessels and nerve fibers, with sectional destruction of some of them. Among other indications, these experiments show that retrobulbar neuritis is not due exclusively to multiple sclerosis. (Four figures, bibliography.) M. Lombardo.

Lebas, J. **The evolution of a case of subacute bilateral optic neuritis.** Bull. Soc. Belge d'Opht., 1933, no. 67, p. 82.

A case was diagnosed as retrobulbar neuritis because central vision was first greatly diminished with but slight changes in the ophthalmoscopic picture, and finally each eye developed a central scotoma, although there was later papillitis. The etiology was not determined. There was abolition of light perception for ten days, yet ultimate recovery was relatively important, the last report of vision being O.D. 1/4, O.S. 1/10. J. B. Thomas.

Manes, A. J. **Retrobulbar neuritis.** Arch. de Oft. de Buenos Aires, 1933, v. 8, Dec., pp. 592-600.

The author discusses briefly the points of view of representatives of the English, German, American, French, and Belgian schools in regard to the etiology, pathogenesis, and symptomatology of retrobulbar neuritis. The different schools do not agree on etiology and pathogenesis. Special emphasis is laid on the use of quantitative perimetry for the detection of fine field changes. R. Castroviejo.

Sabbadini, D., and Silvagni, M. **Effect of operation on retrobulbar optic neuritis due to sinusitis.** Riv. Oto-Neuro-Oft., 1934, v. 11, Jan.-Feb., pp. 81-97.

Three men had symptoms of chronic retrobulbar optic neuritis. The patients had not overindulged in intoxicants, and rhinoscopic and radiologic examination of their sinuses was negative. But opening of their posterior sinuses, which were found normal, was followed either by improvement of symptoms or by complete recovery.
M. Lombardo.

Shannon, C. E. G., and McAndress, L. F. **Diabetic and tobacco amblyopia.** Arch. of Ophth., 1934, v. 11, May, pp. 757-762.

The case reported is that of a man aged forty-two years, who had been

a heavy drinker and smoker for over fifteen years. Three months previously he had suddenly noticed poor vision in both eyes, and diabetes had been discovered. Vision was R.E. 6/60 and L.E. 6/22. There was temporal pallor of the right disc and a cecocentral scotoma for colors in each eye. Slow but progressive improvement followed treatment for the diabetes, removal of focal infection, abstinence from alcohol and tobacco, and weekly intravenous injections of sodium nitrite. After three months the vision was 6/9 in each eye, only a small projection of the blind spot toward fixation was present in the right eye, and there was no scotoma in the left eye. The literature is reviewed as to the relationship of diabetic amblyopia to tobacco-alcohol amblyopia, theories of etiology, and reports of pathologic examination.

J. Hewitt Judd.

12. VISUAL TRACTS AND CENTERS

Pereira, R. F. **Chiasmatic syndrome.** Arch. de Oft. de Buenos Aires, 1933, v. 8, Dec., pp. 553-591.

The author discusses in detail present-day knowledge of the optic pathways; and also the etiology, pathogenesis, and symptoms of the chiasmatic syndrome. Five cases are reported of tumor of the hypophysis treated surgically. (Illustrations, bibliography.)

R. Castroviejo.

13. EYEBALL AND ORBIT

Agnello, F. **Orbital cellulitis secondary to acute dacryocystitis.** Riv. Oto-Neuro-Oft., 1934, v. 11, March-April, pp. 135-144.

A man of thirty years affected by phlegmon of the right sac showed marked exophthalmos with outward and downward deviation of the eyeball, swelling of lids, and chemosis. The vision of this eye was normal and the fundus showed slight congestion of the retinal veins. The nasal mucous membrane of the same side was hyperemic and showed traces of blood. At operation some pus came from the sac region, no pus came from the opening of the orbit, but the orbital plate of the ethmoid was found denuded of periosteum. Complete recovery followed. The infection had spread to the orbit indirectly through the orbital plate of the ethmoid. (Bibliography.)

M. Lombardo.

Cornet, Emmanuel. **A cured case of orbital phlegmon with staphylococcus septicemia following a furuncle of the nose.** Ann. d'Ocul., 1934, v. 171, May, pp. 428-430.

Usually a furuncle causes thrombophlebitis, but in this case true orbital cellulitis developed.

H. Rommel Hildreth.

Cornet, Emmanuel. **A case of simple angioma of the orbit. New treatment by retrobulbar alcohol injection.** Ann. d'Ocul., 1934, v. 171, May, pp. 431-432.

Marked monocular nonpulsating exophthalmos existed in a fourteen-month infant. A diagnosis of hemangioma of the orbit was confirmed by drawing blood with a syringe. Alcohol injected twice led to reduction of the exophthalmos and left the eye mobile.

H. Rommel Hildreth.

Patriarca, A. P., and Rossello, G. **Primary osteoma of frontal sinus and concomitant mucocele with orbital fistula.** Riv. Oto-Neuro-Oft., 1934, v. 11, March-April, pp. 153-161.

A man of seventy-five years, affected for years by frontal headaches, had had for a few days both left lids swollen, marked tenderness of the upper lid, and protruding eyeball. Diaphanoscopy and radiography showed an opaque left frontal sinus. Opening the orbit along its upper margin revealed an osteoma occupying part of the frontal sinus, while the other part contained a mucocele communicating by a fistula with the orbit and provoking an abscess in the upper half of the latter. (Two figures.)

M. Lombardo.

Tiscornia, B. J. **Unilateral exophthalmos due to syphilitic osteoperiostitis.** Arch. de Oft. de Buenos Aires, 1934, v. 9, Jan., pp. 36-44.

This is a case report on a unilateral exophthalmos which, in spite of re-

peated negative Wassermann, was completely cured by intensive treatment with bismuth, mercury, and salvarsan. (Six illustrations.) R. Castroviejo.

14. EYELIDS AND LACRIMAL APPARATUS

Agnello, F. **Orbital cellulitis secondary to acute dacryocystitis.** Riv. Oto-Neuro-Oft., 1934, v. 11, March-April, pp. 138-144. (See Section 13, Eyeball and orbit.)

Cordero, C. **Relations between dacryocystitis and sinus affections.** Riv. Oto-Neuro-Oft., 1934, v. 11, Jan.-Feb., pp. 60-80.

With tabulated report of seventy-eight cases, the author concludes that the sinuses are more frequently affected in the acute forms of dacryocystitis. The complication was definite in 46.15 percent of the cases, the ethmoid being affected in 21.82 percent and the ethmoid and maxillary or ethmoid and sphenoid sinuses in 21.62 percent of all cases. In almost all cases the symptoms of sinusitis disappeared after recovery of the dacryocystitis. (Nine figures, bibliography.) M. Lombardo.

Frost, A. D. **Supporting suture in ptosis operations.** Amer. Jour. Ophth., 1934, v. 17, July, p. 633.

Greenbaum, S. S. **Seborrheal blepharitis, with a note on the value of roentgen therapy in its chronic stages.** Arch. of Ophth., 1934, v. 11, April, pp. 604-610.

The blepharitides are classified as cutaneous, glandular, and follicular. The glandular types are seborrhea, meibomian, and sudoriparous. The author discusses the seborrheal type from the standpoint of a dermatologist and summarizes his results in the treatment of fifteen patients with the roentgen ray. These were given six to eight weekly exposures to a current of 3 ma. with a six-inch spark gap at a distance of twelve inches for one minute, without filter. The treatment was of unquestionable value in the chronic, red, thickened forms of seborrheal blepharitis, but only as an additional method. In most cases the improvement was only temporary. (Discussion.) J. Hewitt Judd.

Papoloczy, F. **Contribution to the question of tear-sac trachoma.** Klin. M. f. Augenh., 1934, v. 92, May, pp. 613-619.

The author studied the histology of eight tear sacs from trachomatous subjects and fourteen inflamed tear sacs unassociated with trachoma. No pathognomic characteristics were found. The presence of many confluent follicles suggests trachoma, as does a characteristic differentiation of the follicles into a central zone of large pale cells which is surrounded by a peripheral zone packed with lymphocytes. The central cells are characterized by polymorphism which might suggest malignancy. F. H. Haessler.

15. TUMORS

Cohen, M. **Orbital lymphoma in chronic lymphatic leukemia.** Arch. of Ophth., 1934, v. 11, April, pp. 617-624.

A man aged sixty-five years, who had chronic lymphatic leukemia, presented gradually increasing ptosis and exophthalmos of the right eye for a period of three years. A mass 12 by 9 mm., which was not attached to the bone, conjunctiva, or lacrimal gland, was removed from between the globe and orbital roof. It consisted mainly of packed lymphocytes surrounded by an indefinite capsule. The same pathologic structure was found in an inguinal gland. There was no recurrence two years later. The author suggests that an orbital leukemic nodule might arise from lymphatic spaces around the adipose tissue or from perivascular lymphatic spaces as a result of the blood dyscrasia. (Photomicrographs and discussion.) J. Hewitt Judd.

Coppez, J. H. **Evolution of a sarcoma of the iris.** Bull. Soc. Belge d'Opht., 1933, no. 67, p. 29.

Four years previously the author presented a patient aged seventy-two years afflicted with a tumor of the iris. In view of the very slow development of

this sort of lesion and the poor vision of the other eye an expectant course was advised. After four years there had been no increase in volume of the tumor and no decrease in visual acuity. Morax is quoted to the effect that there is not the same danger of dissemination when the tumor is located on the iris as when it affects the choroid. J. B. Thomas.

De Jean, C. **True glioma of the retina (Astrocytoma of the adult retina).** Arch. d'Opht., 1934, v. 51, May, p. 257.

After historical discussion of the literature on glioma of the retina the writer points out that the malignant tumor of the retina commonly designated as glioma differs structurally from glioma as found in other parts of the nervous system where the tumor is comparatively benign and is of glial origin. But to prove that true glioma is found in the retina a personal observation of such by the writer in a man of sixty-seven years is cited with minute description and photomicrographs of the tumor. The more malignant type of tumor found in younger individuals should be recognized as neuroblastoma and should not be confused with true glioma. M. F. Weymann.

Freeman, D. **Neurofibroma of the choroid.** Arch. of Ophth., 1934, v. 11, April, pp. 641-645.

During routine postmortem examination of a negro aged 56 years, who died of urinary suppression, a diffuse neurofibromatous thickening of the choroid was found which was not associated with similar lesions in any other organ. It surrounded the entrance of the optic nerve and extended peripherally 3 to 4 mm. The greatest thickness was in the region of the entrance of the posterior ciliary arteries. Histologically the normal components of the choroid were found to be spread apart by strands and whorls of fine fibrils with occasional large ganglion cells scattered throughout. The fibrils were not found in the choriocapillaris but were most thickly developed in the deeper layers, forming dense sheaths around the larger arteries. The author concludes that the growth in this type arises from the perivascular nerve plexus in contradistinction to the discrete type of tumor which arises from the ciliary nerves. (Photomicrographs.) J. Hewitt Judd.

Malan, A. **Ethmoidoorbital osteoma, and encephalocele due to endocranial prolongation.** Riv. Oto-Neuro-Oft., 1934, v. 11, Jan.-Feb., pp. 47-59.

A woman of twenty-six years affected by recurrent right fronto-orbital headaches with nausea and fever had a sensation of endocranial water-like movement and a painful sensation in right forehead region on blowing her nose. The eye examination showed only a slight outward exophthalmos of the right eye. X-rays showed a compact mass located in the inner side of the orbit from the ethmoid to the optic foramen with signs of bilateral ventricular pneumatocele. The operative procedures disclosed a prolongation of the osteoma which perforated the roof of the orbit, the dura, and the frontal lobe and created a communication with the anterior pole of the right ventricle. The author concludes that diagnosis of osteoma is essentially radiographic. The mechanism of air penetration in the brain, operative indications, and different types of operation are discussed. (Five figures.) M. Lombardo.

Müller, R. W. **A neurinoma of the orbit with clinical signs of an optic nerve tumor.** Klin. M. f. Augenh., 1934, v. 92, May, pp. 592-600.

In a young patient a lesion which began with the manifestations of optic nerve tumor, but gradually filled out the orbit, proved to be a neurinoma. It had probably arisen in the dural sheath of the optic nerve. For embryologic reasons its origin in the optic nerve itself is denied. F. H. Haessler.

Poos, F. **The relationship between pathologic changes and clinical manifestations in carcinomatous metastases in the optic and oculomotor nerves.** Klin. M. f. Augenh., 1934, v. 92, May, pp. 585-592.

The findings in one case of metastatic carcinoma primary in the pancreas are described. There are no characteristic

findings which justify the diagnosis of brain metastasis with involvement of the optic nerve. A probable diagnosis can be made when there is evidence of widespread carcinomatosis.

F. H. Haessler.

16. INJURIES

Booshmich, D. **Protective device for the turning lathe.** Sovietskii Viestnik Opht., 1934, v. 4, pt. 4, p. 410.

Ostroumov and Galanin have shown that open corrective spectacles are superior to goggles from the standpoint of protection. Goggles narrow the visual field and, because they become quickly covered with perspiration and marred by flying pieces of metal, they cause ocular fatigue. In the Stalin Industries ninety percent of the workers were provided with corrective lenses and the number of injuries by flying particles was reduced from thirty percent in 1929 to 5.6 percent in 1931. Corrective lenses do not protect the eye from particles entering from the side. A protective device attached to the turning lathe reduced the number of injuries from 173 in 1930 to none in 1931. (Illustration.) Ray K. Daily.

Damel, C. S. **Siderosis bulbi.** Arch. de Oft. Hisp.-Amer., 1934, v. 34, May, p. 233.

An overlooked intraocular iron particle was diagnosed six months later because of siderosis, in spite of a negative x-ray. The eye was enucleated fifteen months later because of iridocyclitis. A 1-mm. iron particle was adherent to the retina. Using a reagent for iron, the deposits in the cornea were found to be most abundant in the deeper layers near the limbus, and were also found in the epithelium and endothelium, but not in Descemet's or Bowman's membrane. In the iris the deposits were more abundant in the cell bodies, while melanin was more abundant in the cell processes, indicating a gradual displacement of the latter by the former. The greatest impregnation was in the trabeculae, the canal of Schlemm, and the pigment epithelium of the ciliary body. The retina showed occasional nests of siderosis in the ganglion-cell and nerve-fiber layers near the posterior pole. The optic nerve showed deposits in the lamina cribrosa and in the perivascular lymph spaces. (Photomicrographs.) M. Davidson.

Key, B. W. **Viability of the margin of the lid with cilia after twenty-four hours in the eyeball.** Arch. of Ophth., 1934. v. 11, April, pp. 687-689.

Twenty-four hours after an injury to the right eye and eyelids of a lady aged thirty-eight years, a curled-up whitish piece of tissue which proved to be a small strip of the margin of the lower lid was removed from the anterior chamber of the eye. The globe was enucleated and the tissue sutured to the margin, which had been gently scarified. Eight months later the margin was in its original position and fifteen of the nineteen cilia on the strip remained in their normal position. (Photographs.) J. Hewitt Judd.

Levine, J. **Siderosis bulbi (xenogenous).** Arch. of Ophth., 1934, v. 11, April, pp. 625-634.

The author reviews the literature and concludes that the development of xenogenous siderosis depends on the oxidizable qualities of the foreign body, its situation in the globe, and the length of time present. The iron has a special affinity for, and is deposited in, the cells of ectodermal origin, but is removed from the globe by histiocytes, which originate from mesoderm. The glass membranes are impermeable to the diffusion of colloidal iron. The removal of the iron may result in complete restoration of the function of cells otherwise impaired by the presence of iron. It is shown that xenogenous and hematogenous siderosis can often be differentiated clinically as well as microscopically and that a roentgenogram is not infallible, especially in cases of foreign body in the anterior segment. (Bibliography.) J. Hewitt Judd.

Lichtner, V. **Traumatism and protection of the eyes in the Saratov Industrial Establishment.** Sovietskii Viestnik Opht., 1934, v. 4, pt. 4, p. 403.

For the first eight months of 1932 there were 528 ocular injuries, representing 7.8 percent of all injuries. A survey of the industry showed that protective lenses soiled easily and interfered with work so that workers did not wear them. The survey commission called for installation of protective devices, wearing of large round corrective spectacles by workers threatened by flying particles of metal, and development of lenses absorbing ultraviolet rays for workers with the torch.

Ray K. Daily.

Shevchook, Y. **Denig's operation for caustic burn of the eye.** Sovietskii Viestnik Opht., 1934, v. 4, pt. 4, p. 416.

A caustic burn produced necrosis of the conjunctiva of the lower lid and the lower portion of the eyeball. The necrosed conjunctiva was cut away and replaced with mucous membrane of the lip. Six weeks later the cornea was hyposensitive but transparent, and vision was normal. Ray K. Daily.

17. SYSTEMIC DISEASES AND PARASITES

Agnello, F. **Clinical varieties and ocular lesions of herpes zoster.** Riv. Oto-Neuro-Oft., 1934, v. 11, March-April, pp. 172-193.

After an attack of influenza and otitis of the left side a boy of four years became affected with a papular eruption at the left side of the forehead along the course of the terminal branches of the frontal nerve. A boy of seven years, recovering from an attack of Koch-Weeks conjunctivitis, became affected by vesicles in the middle of the forehead, and the lower internal quadrant of the right cornea showed a punctiform infiltration. In this case the disorder developed along the internal frontal nerve and the nasociliary, and the short and long ciliary nerves were also affected. A man of forty-three years showed vesicles on the left side of the face and forehead, and similar lesions on the left bulbar conjunctiva and soft palate, and had corneo-conjunctival hypesthesia and hyperesthesia of the left face and palate. All three branches of the left trigeminus were affected in this case. M. Lombardo.

Bellows, J. **Ocular complications of erysipelas.** Arch. of Ophth., 1934, v. 11, April, pp. 678-683.

This study is based on 130 cases of facial erysipelas observed at the Cook County Hospital. The eyes or adnexa were involved in 103 cases. Orbital cellulitis occurred in six cases, two bilateral, and blindness resulted in three cases, two bilateral. Corneal ulcer occurred in three cases and superficial abscess of the lid in seven. In one case of orbital cellulitis with signs of meningeal irritation, evisceration of the orbit was followed by uneventful recovery. The author believes that loss of vision in this disease is due to orbital cellulitis or corneal disease and rarely to metastatic iridocyclitis or abscess of the vitreous. J. Hewitt Judd.

Blackberg, S. N., and Knapp, A. A. **Ocular changes accompanying disturbances of calcium-phosphorus metabolism.** Arch. of Ophth. 1934, v. 11, April, pp. 665-669.

A series of experiments was conducted primarily to determine the effect of rachitogenic diet on dental caries. It was noted that all the rachitic pups developed ocular lesions while the controls, fed the regular kennel diet, did not. After about six weeks the pups developed prominence of the globe with widening of the palpebral fissure, increased lacrimation, congestion of the conjunctiva and nictitating membrane, circumcorneal episcleral injection, and ectasia of the cornea. At the eighth week lens opacities appeared and they rapidly developed into mature cataracts. One pup fed on this diet for twenty-nine weeks presented keratitis with a perforating corneal ulcer, iridocyclitis, neuritis, orbital cellulitis, and dacryoadenitis. The authors point out that, since conical cornea is so frequently associated with dental pathology, disturbance of calcium-phosphorus metabolism may be an etiologic factor.

J. Hewitt Judd.

Coppez, H. **A solitary case of Marfan's syndrome.** Bull. Soc. Belge d'Opht., 1934, no. 67, p. 102.

The syndrome of Marfan consists essentially of congenital dystrophy of the mesodermal tissues, including bone, tendons, muscles, ligaments, connective and adipose tissues, heart and vessels. The affection is often familial. Ocular symptoms often observed are subluxation or total luxation of the crystalline lenses, atrophy of the stroma of the iris, and slight retraction of the eyeballs because of lack of orbital fat. The case reported by Coppez is of especial interest because he has been able to observe it over a period of years and because the case is solitary among eleven brothers and sisters and without any known familial antecedents. (Fourteen figures including radiograms, nine references.) J. B. Thomas.

Pavlov, H. **The influence of climate and occupation on the eyes of lepers.** Sovietskii Viestnik Opht., 1934, v. 4, pt. 4, p. 413.

The five Russian colonies for lepers are described. The severity and number of ocular complications are proportional to climatic severity and overwork.

Ray K. Daily.

18. HYGIENE, SOCIOLOGY, EDUCATION, AND HISTORY

Adams, A. L., Gamble, R. C., Gifford, S. R., and Gradle, H. S. **An ophthalmological survey of Illinois State School for the Blind.** Amer. Jour. Ophth., 1934, v. 17, July, pp. 624-626.

Bickerton, J. M. **The menace of hereditary blindness.** Brit. Med. Jour., 1934, Jan. 20, p. 93.

In England about one-fourth of all blindness is due to strictly hereditary causes. Bickerton discusses these, and numerous genetic charts are given. Possible remedies are reviewed.

John C. Long.

Krause, A. C. **Assyrio-Babylonian ophthalmology.** Annals Med. History, 1934, v. 6, Jan., p. 42.

The author gives a brief summary of the origin of Assyrio-Babylonian medicine and elaborates upon the ophthalmic practices of the times. Ancient medical libraries and laws pertaining to medicine are discussed. The etiology, diagnosis, therapy, prognosis, and prophylaxis of certain ocular diseases as considered by these people are illustrated by quotations from their writings. In addition to elaborate medical procedures, magic and incantations form a great part of treatment and prophylaxis. Religion has never been clearly separated from medicine.

John C. Long.

Poleff, L. **Some peculiarities of the campaign against trachoma in countries of mixed population.** Rev. Internat. du Trachome, 1934, v. 11, April, p. 99.

Treatment and prophylaxis of trachoma require a special organization with government support, since the classes most affected by the disease are the poorest. General inspection of the eyes in a trachomatous locality is advocated, with treatment of affected adults in their homes and of affected children in the schools.

Phillips Thygeson.

Vallarino, C. **Geographic distribution of trachoma in the province of Huelva (Spain).** Rev. Internat. du Trachome, 1934, v. 11, April, p. 117.

The geographic distribution of trachoma in the province of Huelva is described in detail. The population of the seaport towns is most heavily infected.

Phillips Thygeson.

Walsh, J. J. **Popular medieval ophthalmology.** Arch. of Ophth., 1934, v. 11, April, pp. 670-677.

The author cites the books by Peter of Spain and Benvenutus Grapheus of Jerusalem and gives the English translation of the paragraphs from Bartholomew's "De proprietatibus rerum" which deal with ocular disease. These were written just before the middle of the thirteenth century and show a much greater knowledge of these diseases than is thought to have existed at that time. J. Hewitt Judd.

NEWS ITEMS

News items should be sent to the Editor by the twelfth of the month.

Deaths

Dr. Frank Anderson Overbay, New Orleans, died suddenly May 10, of heart disease.

Dr. George Benjamin Collier, New Orleans, died July 9, aged 44 years, of acute gastroenteritis and acute nephritis.

Dr. Peter Taylor Grant, Grand Rapids, Mich., aged 50 years, died July 16, of streptococcus infection.

Miscellaneous

The Ophthalmological Clinic of the Hotel-Dieu (Paris) will give a course in ophthalmology beginning October 19, 1934. The course will be conducted by Prof. F. Terrien, assisted by Professors Regaud, Velter and Dr. Renard, ophthalmologists to the hospital. Assisting also will be Drs. Veil, J. Blum, Dollfus, Hudelo and Madame Braun-Vallon, chiefs of clinic and laboratory.

The program consists of a series of twelve lectures devoted to a variety of subjects. These will include talks on cataract surgery; the surgery of glaucoma hypertension in iritis; anterior chamber paracentesis. Two lectures will be given on retinal detachment and recent developments in the care of this condition. Muscle surgery and operations on the lacrymal sac are followed by discussions on plastic surgery of the lids and conjunctiva. A visit to the Radium Institute will accompany the talk on radium therapy of tumors. The course will end with orbital operations, and the surgery of entropion, ectropion and ptosis. Special operations will be arranged for demonstration during the course. A certificate will be given at the end.

Tuition will be 300 Francs. Application may be made to the Secretary of the Faculty.

Societies

At a recent meeting of the Council of the Oxford Ophthalmological Congress the following executive appointments were made for 1935. Master: C. G. Russ Wood; Immediate Past Master; Cyril H. Walker; Deputy Master: Philip H. Adams; Hon. Secretary and Treasurer: F. A. Anderson, 12 St. John's Hill, Shrewsbury. The dates for the next Congress are July 4th, 5th, 6th, 1935.

Personals

Dr. Hans Barkan and Dr. W. Edgar Borley announce their association in the practice of ophthalmology at Stanford Hospital, San Francisco.